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# COMPUTERWORLD

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# OS/2 LAN pact lacks IBM seal

BY PATRICIA KEEFE
CW STAFF

NEW YORK — Microsoft Corp. and 3Com Corp. joined forces last week to position the OS/2 LAN Manager as "the open platform for advanced computer networking," but analysts said the strategy lacks one crucial component: an IBM endorsement.

The two vendors announced an agreement to jointly develop and market Microsoft's OS/2 LAN Manager, the next generation of the Microsoft Networks protocols [CW, June 29].

However, without IBM's blessing and significantly more technical detail on the LAN Manager, skeptical analysts were inclined to dismiss the joint venture as premature positioning.

A lot can happen in nine months, they said, noting that the OS/2 LAN Manager is slated to ship in the first half of 1988.

Microsoft and 3Com "are operating from the premise that the LAN Manager is already a standard and IBM will have no choice but to support it," said Thomas White, president of The Seybold Group, Inc., a market research firm in Santa Clara, Calif. But, he continued, "How can you call something that isn't even in the market a standard?"

The presidents of both companies — 3Com's William Krause and Microsoft's Jon Shirley — expressed confidence that the OS/2 LAN Manager will be accepted as a standard. "IBM's support would, of course, be overwhelmingly beneficial," conceded Krause, who nonetheless rejected arguments that IBM's backing was a prerequisite for success.

"OS/2 LAN Manager will be

*Continued on page 4*

# Multitask option on Mac menu

*Apple's Juggler could upstage OS/2 by skirting application rewrites*

BY DOUGLAS BARNEY
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. may beat both Microsoft Corp. and IBM to market with a large-memory microcomputer operating system that provides a form of multitasking and a group of enhanced data-sharing capabilities.

An extension, dubbed Juggler, to the Apple operating system will run the bulk of existing Apple Macintosh applications, according to several developers who are currently testing the product.

For OS/2, the operating system due out from IBM and Microsoft next year, applications must be rewritten to take advantage of added capabilities. Existing IBM Personal Computer applications will run in OS/2's compatibility box, but they will not take advantage of multitasking and will run slowly, Microsoft has said.

**Low cost/no cost?**

Juggler, expected to ship later this year, is aimed squarely at current Macintosh users and is expected to be distributed aggressively. Both users and developers contacted last week said they believe, based on indications from Apple, that Juggler will be available at no cost or for a minimal charge.

The number of applications open at one time and the size of individual applications and data sets are limited only by the amount of random-access memory the machine contains, developers said. The Macintosh II, for example, is expandable to 8M bytes of RAM on its logic board, and more memory can be added using expansion slots.

The product will run on most versions of the Macintosh, including the Macintosh 512KE, Macintosh Plus, Macintosh SE and Macintosh II, according to a developer briefed by Apple. Because of the limitations of the Macintosh 512KE, Juggler is not expected to run effectively on that machine, the developer said.

Another developer said he found his firm's Macintosh software to be "instantly compatible." The first developer cautioned, however, that

*Continued on page 85*

# Competition thriving despite lessor buy-outs

BY CLINTON WILDER
CW STAFF

The increasing dominance of the computer leasing industry by a small number of large, acquisition-minded lessors will not slow competition or increase lease rates, according to corporate computer users.

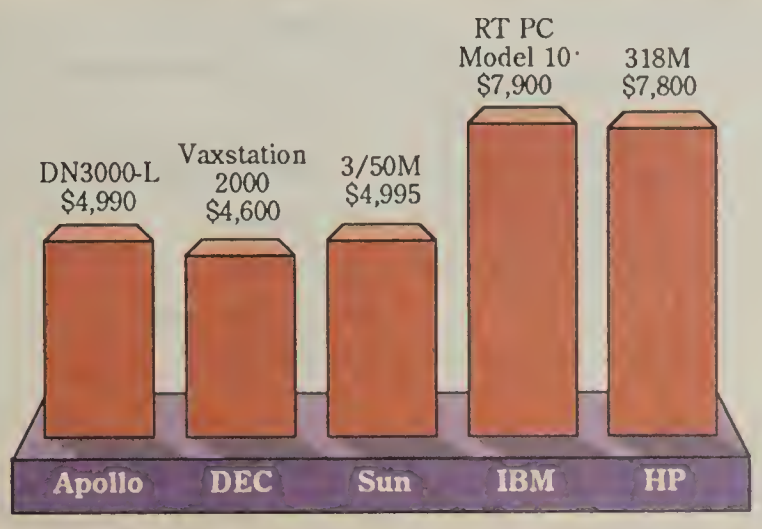
The rapid pace of industry consolidation, evidenced by a series of acquisitions within the past year, is reshaping the industry into two tiers: very large lessors and very small, specialized ones. But in contrast to users' negative impressions of major acquisitions in the hardware and software industries, computer lessees say the consolidation will maintain or even increase the leasing industry's traditionally fierce competition.

"Smaller firms that have been acquired are coming on more aggressively," says William Dean, director of technical services at Pepsico, Inc. in Purchase, N.Y. "They can go after business they wouldn't have been able to be-

*Continued on page 8*

## Apollo answers price challenge

*Apollo last week joined DEC and Sun with entry-level systems priced below $5,000.* **See story page 6.**




CW CHART: MITCHELL J. HAYES

# Judge Greene wrong number for the Bells?

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — In three days of hearings last week on the future of the regional Bell holding companies, U.S. District Judge Harold H. Greene appeared highly skeptical of arguments that the Bell companies should be given complete freedom from the AT&T divestiture judgment.

The 1983 Modified Final Judgment prevents the Bell companies from entering the long-distance, manufacturing and information service businesses. But the regional holding companies and the Department of Justice are urging the court to remove those barriers on grounds that growing competition and enhanced regulation by the Federal Communications Commission make them unnecessary.

In the case of long-distance

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*"God forbid you lose market share. It's cutthroat out there."*

HARVEY KINZELBERG
CHAIRMAN
THE MERIDIAN GROUP
ON THE COMPUTER
LEASING INDUSTRY

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# Toshiba fears boycott

*Execs resign after Senate reaction to USSR sale*

BY MITCH BETTS
CW STAFF

The top two executives of Japan's Toshiba Corp. abruptly resigned last week in hopes of appeasing angry U.S. legislators who voted to ban Toshiba imports because a company subsidiary sold advanced submarine technology to the Soviet Union.

Despite the resignations, the vote in the U.S. Senate and a threatened U.S. boycott of Toshiba products are jeopardizing "our continued existence in the American market," said Nobuo Ishizaka, chairman and chief executive officer of Toshiba America, Inc., the firm's U.S. subsidiary, which sells a line of laptop computers and consumer electronic products.

While claiming that Toshiba Corp. had no involvement or awareness of the Soviet sale by Toshiba Machine Co., the resigned executives accepted "personal responsibility" in a move characterized by Ishizaka as the highest form of apology in the Japanese business world.

### Senate votes to ban

The Senate voted Wednesday to ban Toshiba imports for at least two years; the House of Representatives is expected to vote on a similar provision to a pending trade bill. Toshiba Machine, which is 51% owned by Toshiba Corp., had previously acknowledged that it and a Norwegian firm sold computer-controlled milling machines that will enable the Soviets to manufacture quieter submarine propellers that will make it more difficult for U.S. monitoring equipment to detect Soviet submarines [CW, June 29].

In an interview with *Computerworld*, Ishizaka said that technically, Toshiba America could continue its microcomputer business because of an exemption contained in the bill. But he said it would not make good business sense to continue the U.S. operation if there is a consumer backlash against Toshiba.

The Senate bill contains an exemption allowing the importation of parts for U.S. production. Toshiba America's Information Systems Division imports parts from Japan and assembles the microcomputers at its plant in Irvine, Calif.

Recently, Toshiba America has been hobbled by a punitive 100% import tariff on its 16-bit laptops [CW, April 27], which Ishizaka confirmed has caused some product shortages.

"The Senate bill, if it is enacted, will affect our business totally . . . all across the line. We have to consider how we can cope with the situation as a whole matter of our continued existence in the American market," Ishizaka said. He said he hopes that last week's resignations of two top executives — Shoichi Saba, chairman, and Sugiichiro Watari, president — of the Japanese parent firm will lessen the U.S.'s anger.

The resignations came shortly after the Senate passed an amendment, by a vote of 92 to 5, to the omnibus trade bill that would ban most Toshiba imports, thus reflecting congressional outrage over the damage to national security. Similar legislation has strong support in the House of Representatives, but the Department of State is opposed to the sanctions.

### Designed to punish

Sen. Jake Garn (R-Utah) said the amendment was designed "to punish those companies and to send a message around the world that we are finally tired of talking about it. We wish to penalize them where it really hurts — in their pocketbook."

Garn's amendment requires the president to impose the import ban for a period of two to five years. It allows the president to limit the scope of the sanctions if the company or the Japanese government makes substantial improvements in export controls.

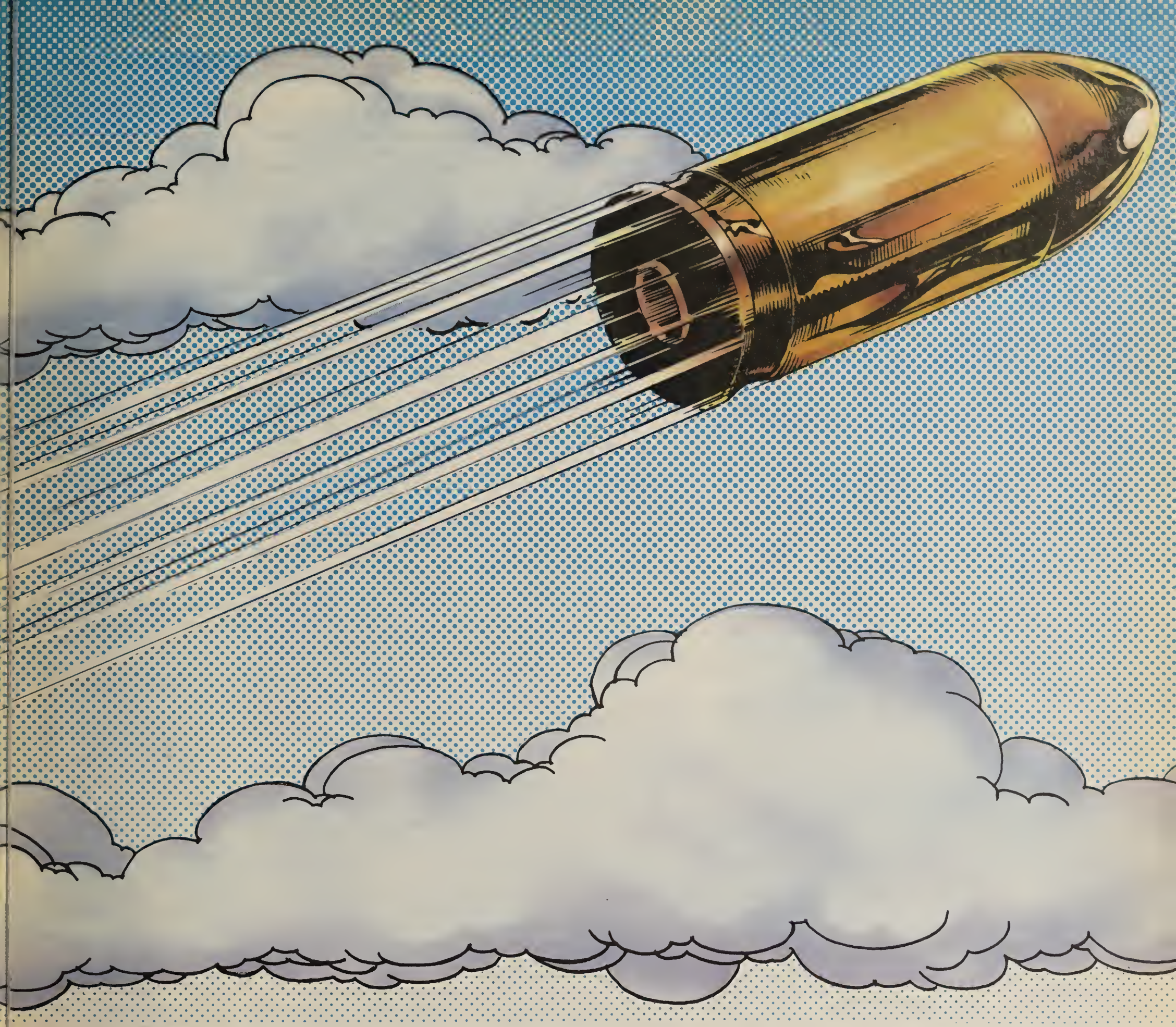
In addition, the measure prohibits Toshiba from making sales to U.S. government agencies, although there are exemptions for certain defense equipment. The sanctions affect Toshiba Corp. and its subsidiaries and affiliates.

### Cases for exemptions

The amendment states that the president may also grant exemptions in the following cases: imports shipped under contracts signed before May 1; spare parts and components essential to U.S. production; and routine service and maintenance of products already supplied to the U.S.

Garn acknowledged that the sanctions against Toshiba could be considered unconstitutional because they apply retroactively to export-control violations dating back to 1980. But he said if that part of the amendment is stricken, other parts of the measure would apply sanctions against future violators.

Sen. Richard C. Shelby (D-Ala.) had previously offered an unsuccessful amendment to ban Toshiba imports permanently, but Garn suggested that such an approach would probably put the firm out of business and harm U.S. interests. "It really is a matter of degree. Emotionally . . . I would like to kick them out of the country permanently," Garn said. But the two-year ban "will have the impact we want: It will scare them to death."



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# New models of 3090 head for user sites

BY JAMES CONNOLLY
and STANLEY GIBSON
CW STAFF

KINGSTON, N.Y. — The first shipments of IBM's newest high-end and mid-range 3090 models left IBM's factory here late last week, destined for user sites.

IBM officials announced that the first 3090 Model 600E system was being shipped to the American Express Co. data center in Phoenix.

The Model 600E is a six-processor system that was introduced in January as IBM's most powerful machine. The Model 600E claims a performance rating of about 75 million instructions per second (MIPS).

IBM said the first 3090 Model 300E, a three-CPU system, was shipped to the Aetna Insurance Co. in Hartford, Conn.

The Model 300E, also introduced in January, is rated at about 46 MIPS and fits in between the 3090 Models 200E and 400E in IBM's product lineup.

### Early delivery

The deliveries occurred earlier than originally scheduled, according to IBM. When announced, the Models 300E and 600E were slated for third-quarter availability.

However, in June, IBM said the deliveries would begin by the end of that month. Field upgrades to the Models 300E and 600E also began shipping last week, IBM said.

George DiNardo, executive vice-president of Mellon Bank, said he has signed up to have his 3090 Model 400 upgraded to a 3090 Model 600E. That upgrade, which entails adding two uniprocessors and changing all the existing Thermal Conduction Modules in the Model 400, is in the process of being scheduled, DiNardo said.

The changeover, although a complex one, will take only one day and will be done on a weekend, he added.

### Up to six-way processor

DiNardo said he has learned from recent discussions with IBM personnel that the 3090 will grow to no more than a six-way processor.

Another industry source said he had been told the same thing by IBM. Some observers have speculated that the 3090 will grow to an eight-way machine.

DiNardo said that going from four to six processors created significant software complexities that would make going to an eight-way machine extremely difficult.

"We're having a hard time going from four to six processors," DiNardo said. He added that this difficulty made it apparent to him that a six-way machine is the 3090's upper limit.

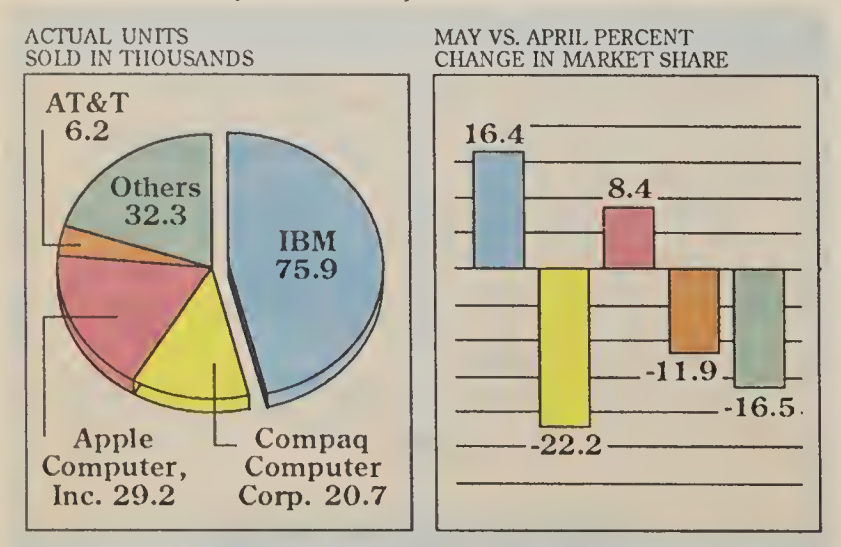
In signing documents for the Model 600E upgrade, DiNardo noted that transportation charges had been eliminated by IBM. On June 16, IBM announced the new billing procedure in what it called a "business simplification."

Last week, an IBM spokesman confirmed that the charges were eliminated entirely and not simply combined with other billing items. As a result, all IBM products that must be shipped are less expensive now, compared with one month ago, by the amount of the shipping charge, the spokesman said.

## Data View

### IBM comes on strong

*Survey of computer stores indicates strong demand for IBM products in May; the PS/2 Model 30 accounted for one-third of IBM's PC sales*




INFORMATION PROVIDED BY STOREBOARD, INC.
CW CHART

# OS/2 LAN

FROM PAGE 1

to PCs what [IBM's] SNA is to mainframes," Krause said, referring to the Systems Network Architecture. He noted that 3Com has assigned 20 to 30 engineers to the project.

Analysts were significantly less optimistic. White called the announcement "the biggest bunch of hooey I ever read in my life." He and other analysts compared the joint announcement to IBM's initial unveiling of the Token-Ring network amid a tidal wave of product promises. "In IBM's case, it didn't help them a lot. Users got very [angry]," White said.

### IBM support doubtful

In fact, few analysts expect IBM will embrace Microsoft's LAN Manager, predicting it will develop similar software on its own. Although IBM remained silent on the issue, analysts said IBM will rely on its OS/2 Extended Edition instead. "OS/2 Extended Edition is strategic for IBM, which refers to it as the lowest rung on the SAA ladder," said Barbara Isgur, a principal with D. H. Brown Associates, Inc. in Tarrytown, N.Y. She was referring to IBM's Systems Application Architecture.

One Wall Street analyst who follows Microsoft noted the glaring absence of IBM representatives from the announcement, in contrast to IBM's hearty endorsement of Microsoft's MS-DOS.

As for users, corporations are expected to standardize on OS/2, focusing in particular on OS/2 Extended Edition, which will feature proprietary Data Base and Communications Managers, said David Thomas, an analyst with Hambrecht & Quist, Inc. in New York. Microsoft and 3Com denied reports that they are working with Digital Communications Associates, Inc. on a Microsoft version of OS/2 Extended Edition.

### 'Full of holes'

White echoed the disappointment of others who attended a briefing session on the OS/2 LAN Manager. "They couldn't do a technical briefing because they don't know what they are doing yet," he said. The OS/2 LAN Manager, he charged, "is a nice marketing concept, but it's full of holes." According to 3Com and Microsoft, the project is on schedule.

3Com also announced 3+Open, the next generation of its 3+ network software, and reannounced a series of hardware upgrades migrating users of its file servers to Intel Corp.'s 80386 chip.

Under the nonexclusive agreement, 3Com will aid LAN Manager development in several areas, including:

- Protocols. 3Com will provide the underlying protocol support, including support for IBM's Netbios, Xerox Corp.'s Network System, XNS Open Systems Interconnect and 802.3.
- Network-specific applications and software tools. Microsoft and 3Com will jointly develop distributed network applications, including a windowing interface, distributed data base services and extensions to allow standard programmatic interfaces for message handling, directory and gateway services.
- Security. Security and network administration capabilities will be boosted significantly to include built-in error logging, audit trails, remote program executions and network statistics.

Not planned is support for IBM's Netview under the LAN Manager, although LU6.2 support is being considered. Analysts said the OS/2 LAN Manager must support key IBM connectivity schemes such as Netview, LU6.2 and Advanced Peer-to-Peer Networking.

Separately, 3Com will merge the LAN Manager with its 3+ software. Also available in the first half of 1988, 3+Open will feature MS-DOS, OS/2 and Apple Computer, Inc. Macintosh integration.

3Com will provide upgrades to 3+Open for current users and announce a series of hardware upgrades for current users of 3+ software and 3Server3 file servers.

3Com is not the only network vendor adding OS/2 LAN Manager support to its software. Novell, Inc. may well remain a significant factor in the race for control of the network market.

### Not yet a has-been

Because IBM's support is still uncertain, some analysts were not willing to dismiss Novell, a rival developer of network software and the acknowledged leader in the PC network market today, as a has-been. By the time the LAN Manager ships in the first half of 1988, Novell will have a formidable installed base of more than one million users, claimed Craig Burton, Novell's vice-president of corporate development.

Burton took exception to comments by Microsoft and 3Com that Novell will find it difficult to provide support for the LAN Manager. "They don't understand what it is that we do," Burton added. While it is true that Novell will not license the LAN Manager, Novell does plan to support both OS/2 and the LAN Manager extensions, Burton said.

If Novell can successfully provide this support, some analysts said it will be better positioned than the OS/2 LAN Manager by providing users with the widest range of support for the jumble of existing and future networking alternatives.

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# Managers hatch plans for still-distant ISDN

*Although widespread implementation is still years away, show-goers prep for network's use*

BY DAVID BRIGHT
CW STAFF

ATLANTIC CITY — Although widespread Integrated Services Digital Network (ISDN) implementations may be five years away, managers attending a communications conference here last week said they are eagerly awaiting ISDN's acceptance and, in some cases, have already begun making long-range plans to use the network at their corporations.

"You have to be looking toward ISDN," said a data communications manager from a large bank who attended the Association of Data Communications Users annual conference here.

ISDN is a digital method of integrating a wide variety of computer equipment into local- or wide-area networks. It was designed to provide high-capacity, highly reliable data, voice and video transmission. Some trial ISDN networks, including one at McDonald's Corp., have already been set up. But many potential users say the lack of standards and the huge capital investment required prohibit a fast transition to the new technology.

> "IBM IS sitting back and waiting to see what the carriers are going to do. The carriers are waiting for the users. It's a circle."
>
> CALVIN O'HIDY
> CHESEBROUGH-POND'S, INC.

Calvin O'Hidy, telecommunications services manager at Chesebrough-Pond's, Inc. in Trumbull, Conn., said it will probably take up to five years before vendors, carriers and users are able to coordinate their ISDN efforts. He likened ISDN's progress to that of IBM's Systems Network Architecture (SNA). SNA was introduced in the mid-1970s but did not catch on in a big way until just three or four years ago, he said.

What is needed to make ISDN successful is a single standard, O'Hidy and other managers said. O'Hidy said IBM, with the help of its Rolm Corp. subsidiary, might be the vendor to offer that standard. "But IBM is sitting back and waiting to see what the carriers are going to do," he added. "The carriers are waiting for the users. It's a circle."

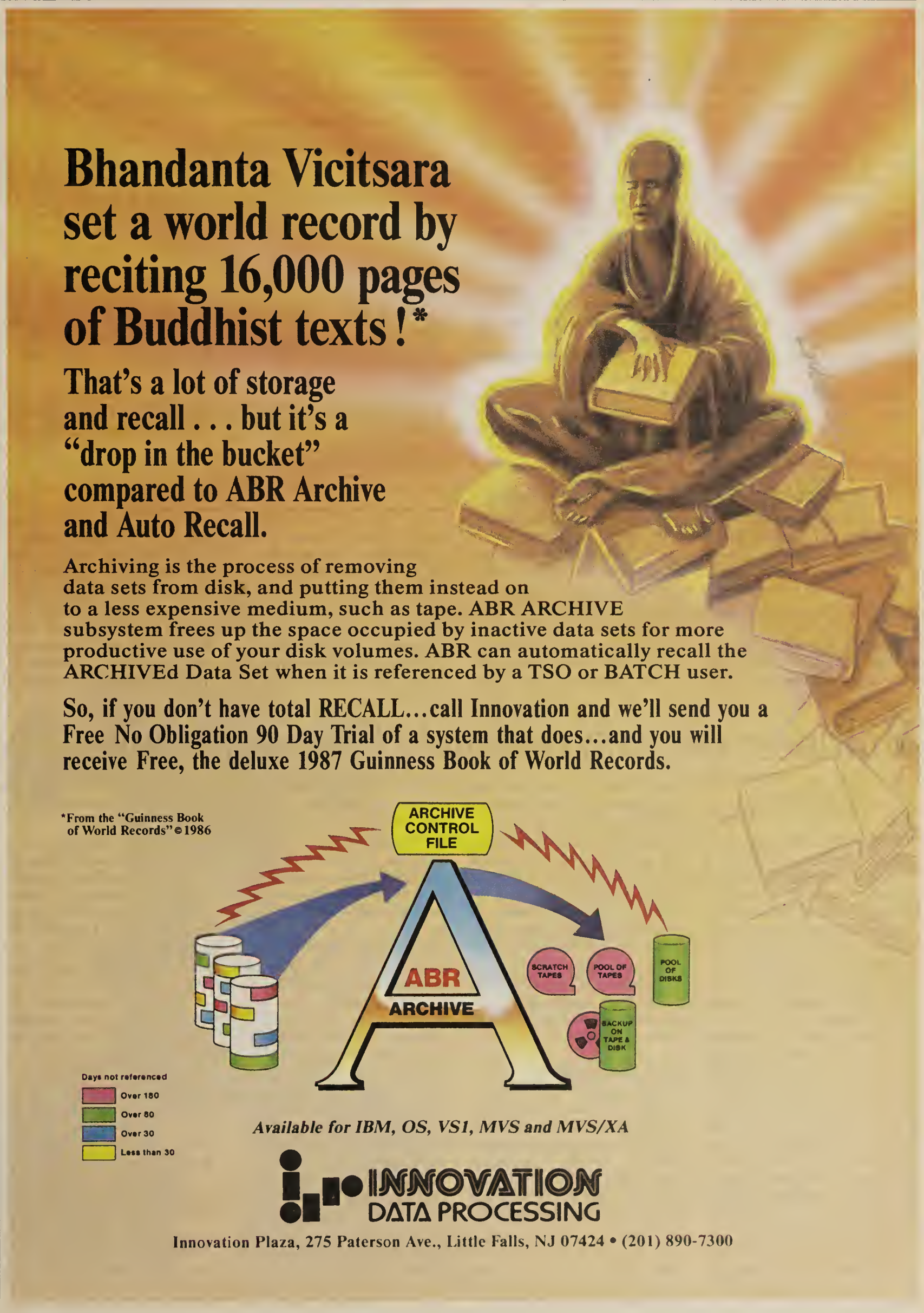
Offering ISDN products is "like giving a party and seeing who shows up," said Stagg Newman Jr., division manager of Bell Communications Research, Inc. in Red Bank, N.J., who was a featured speaker at the conference. "You may not see anybody for a while."

Newman reminded attendees that ISDN is a technology for the mid-1990s. One reason for the delay is the "tremendous capital investment" in both hardware and software, he said.

For instance, he said, before ISDN can come into widespread use, there are thousands of switches throughout the country that will have to be changed. Some of the switches currently in use were installed 50 years ago.

A manager from a large university agreed with Newman. He said that given the size of the required investments in ISDN, his organization cannot afford to make any rash decisions.

The university is now carefully plotting its networking course for the next five or 10 years, he said, and every decision will have a far-reaching impact. For example, he said that one new switch will initially handle as many as 15,000 to 20,000 stations.

# Apollo continues push into new markets

*Adds mid-range workstation, expands connectivity and slashes prices in burst of activity*

BY JAMES CONNOLLY
CW STAFF

BOSTON — Apollo Computer, Inc. continued the thrust of workstation vendors into new markets and price/performance ranges last week with a series of low-priced hardware platforms and connectivity options.

Apollo slashed the entry-level price for its DN3000 series by 50%, introduced the mid-range DN4000 series and added personal computing features such as personal computer connections to its network and PC emulation software running on Apollo's Motorola, Inc. 68020-based workstations.

The introduction of a $4,990 DN3000 and the DN4000, with a base price of $13,900 for a monochrome, diskless workstation, came two weeks after Digital Equipment Corp. drove the entry-level point for its Vaxstation 2000 line from $10,500 down to $4,600. Two months earlier, rival Sun Microsystems, Inc., which is expected to announce high-performance workstations this week, cut its entry-price to $4,995.

The DN4000 is aimed at the high-performance needs of the electrical- and mechanical-design markets, in which Apollo is already strong. But that system and the DN3000 family are also intended to build on Apollo's limited presence in areas such as computer-aided software engineering (CASE), technical publishing, financial services, artificial intelligence and imaging.

Cheryl Vedoe, Apollo's group manager for personal workstations, said the DN3000 is aimed at price-sensitive markets, including CASE and technical publishing.

Apollo also expects to build on its office automation capabilities within those markets through agreements with vendors such as Wang Laboratories, Inc. and Phoenix Technologies Ltd.

However, one analyst, Marcia Brooks of Framingham, Mass.-based research firm International Data Corp. (IDC), said she was impressed by how Apollo is broadening its base but cautioned that if Apollo ventures too far into the general computing field, the firm will find stiff competition in head-to-head battles outside of its traditional markets with companies such as IBM and DEC.

"I don't think we're going to go out immediately and start selling the DN3000 as a general computing system in the OA marketplace. . . . At the same time, we are starting to move into market areas such as financial services, and, as we get into those markets, OA will become more important," Vedoe said.

Phoenix and Apollo developed Domain/PC Emulator, which is the IBM Personal Computer software emulator announced last week. The $500 package allows an Apollo user to run PC applications in a workstation window. According to Apollo, the emulator runs at the speed of an IBM PC XT.

Apollo also offers DN3000 and DN4000 users a hardware option, which runs at the speed of an IBM PC AT but costs $2,400.

Products such as the emulator could drive workstation vendors into the general office automation market, said officials at Motorola, which supplies its 68000 microprocessors to numerous workstation makers.

"People say personal computers are going to migrate up into the office automation marketplace, but I don't see that happening," said Jack Browne, manager of 68000 products. He said the lack of a multitasking operating system for the Intel Corp. 80386 microprocessor will limit PC use in multiuser environments for at least a year. He claimed Unix-based workstation vendors have the communications needed to build networks and mainframe links and $2 billion worth of OA software written for the 68020.

IDC's Brooks said Apollo, once reliant on the proprietary Domain network, is showing a commitment to open architectures and standards such as Ethernet and offers networking options unavailable elsewhere.

Brooks noted that Apollo chose not to undercut DEC in pricing.

"Even though they announced two weeks after DEC, they didn't play the game of saying they're going to be at the bottom end in price," said Brooks, noting that Apollo justified keeping its price $390 above DEC's by saying the DN3000 is more expandable than the Vaxstation 2000.

The diskless DN3000 costs $4,990 with 4M bytes of memory, a floating-point coprocessor, one serial port, an Apollo Domain/IX operating system license, an Apollo token-ring or Ethernet interface and a 15-in. monochrome monitor with 1,024- by 800-pixel resolution.

Apollo also enhanced the DN3000 family with an 8 bit-plane graphics controller providing simultaneous display of up to 256 colors and an engineering change that frees two slots in the PC AT-compatible bus.

Apollo claimed that 20,000 DN3000s have been shipped since the system was introduced in February 1986.

In a competitive analysis, Apollo claimed a price per seat of $12,340 for the DN3000 and DSP4000 server in a four-user configuration, compared with $17,870 for a Sun 3/50M and 3/260S configuration.

Apollo claimed DEC and Sun have no systems comparable with its DN4000, which Apollo said is a PC-type desktop machine with high-end workstation power.

The DN4000 is based on a 25-MHz 68020, which Apollo said processes 4 million instructions per second. A system with a 25-MHz 68881 coprocessor, 16M bytes of memory, a 19-in. color monitor with 1,024- by 800-pixel resolution, 8 bit-planes, a network interface, Domain/IX and Apollo Aegis licenses, a 348M-byte disk drive and a 60M-byte cartridge tape drive costs $45,400.

Shipments are scheduled for August.

A DSP4000 server with 4M bytes of memory costs $12,400.

The company also announced Domain/PCI-Ring, which connects a PC to the Apollo token-ring and costs about $1,150, and plans to offer an Ethernet connection next year.

## Apollo's new lineup

*DN4000 series compared with repositioned DN3000*

| | DN3000 | DN4000 |
|---|---|---|
| *MIPS*[1] | 1.4 | 4 |
| *Processor speed* | 12 MHz | 25 MHz |
| *Memory (bytes)* | 2M to 8M | 4M to 32M |
| *Virtual address speed* | 64M bytes | 1G bytes |
| *Bit-planes* | 4 or 8 | 8 |
| *Base price (Diskless, monochrome)* | $4,990 | $13,900 |
| *Typical price*[2] | $14,900 | $33,900 |

[1] Millions of instructions per second, based on vendor claims
[2] Price includes 155M-byte disk drive, color display Motorola, Inc. 68881 coprocessor, IBM PC AT-compatible bus, serial parts, network interface and Apollo's Domain/IX license

CW CHART

# Multiuser micro system uses fiber-optic links

BY ALAN ALPER
CW STAFF

NEW YORK — A start-up company last week unveiled what it claimed is a new concept in workgroup computing, combining Intel Corp. 80386-based systems with high-speed fiber-optic links for use with multiuser, multitasking operating systems.

Jackson, Miss.-based Sunriver Corp.'s approach entails linking diskless workstations via fiber-optic cable to an 80386-based microcomputer to enable each to function as a separate 386-based personal computer as much as 1,000 feet from the host. By using a fiber-optic link, the diskless workstation can exchange data with the host at 32M bit/sec., Sunriver claimed, an order of magnitude greater than the 1.92K bit/sec. data rate of conventional dumb terminals.

The firm said its tack lends itself well to a variety of multiuser applications in which speedy interaction between host and workstation is required and that it is particularly well suited to generating business graphics — an application that depends on the greater processing power and larger memory capacity of 386-based micros.

"Our approach allows the 386 to distribute its processing power over the user base, providing for true multiuser and multitasking functionality," noted William Long, Sunriver's president and chief executive officer.

### Operating systems

A 386-based host in a Sunriver system reportedly supports a variety of multiuser, multitasking operating systems, including the following: VP/IX and Merge 386, in which Unix runs as a task under Microsoft Corp.'s MS-DOS; Flexos 386 and PC-MOS/386 — multiuser operating systems that emulate Microsoft's MS-DOS — and 386/IX and System V/386, Unix implementations for the 80386.

On a per-user basis, Sunriver's multiuser system is between 25% and 50% less expensive than either conventional PC networks or Intel 80286-based multiuser micros, claimed Gerald Youngblood, executive vice-president and chief financial officer.

A Sunriver system with Compaq Computer Corp.'s Deskpro 386 as its host costs $4,528 per user vs. $6,018 for a three-user network or $4,723 for an IBM Personal System/2 Model 30 or 60, the firm claimed.

Those systems all run a multiuser version of MS-DOS and are equipped with IBM's Enhanced Graphics Adapter (EGA)-capable workstations, the firm noted.

Van Weathers, director of Dataquest, Inc.'s Business Computer Systems Industry Service, said Sunriver's approach facilitates the speedy generation of business graphics, one of the fastest growing applications by users of business computers. "For that reason, I think the product has tremendous potential," he added.

The firm is offering four diskless workstations featuring 14-in. displays; a variety of color bit-mapped graphics support capability; one parallel and two serial ports; a 101-key IBM Personal Computer AT-style keyboard; and an AT sound chip and speaker.

The entry-level station supports IBM Color Graphics Adapter (CGA) color graphics, while the high-end family member offers resolution of 640 by 480 pixels, the ability to display up to 16 colors and CGA color, EGA and EGA+ and Hercules Computer Technology, Inc. graphics boards, the firm said.

Scheduled to be available in October, the workstations range in price from $1,599 to $2,299.

### Adapter board available

An adapter board for a 386-based micro with an AT bus facilitates the attachment of up to four of the diskless workstations via fiber-optic cable. Since AT-class machines offer three 16-bit slots, up to 13 workstations, including the host, can share the resources of the 386-based micro, the firm said.

Priced at $799, the board will reportedly be available in October.

The firm is also offering an adapter card to allow an IBM PC or compatible to function as a 386-based microcomputer. It too is priced at $799 and will reportedly be available in October.

Sunriver said it intends to offer an adapter for IBM's PS/2 family that uses IBM's Micro Channel bus and will develop fiber-optic links for systems using the Multibus and VMEbus architecture.

The company said it plans to sell its products through OEMs and value-added resellers. It already has an OEM deal with SCI Systems, Inc. in Huntsville, Ala., and is negotiating with PGI Corp., a reseller affiliated with Tempe, Ariz.-based Micro Age Computer Stores, Inc., according to Sunriver's Youngblood.

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1-CWX-870706

# IBM, Locus to co-develop PS/2 AIX system

BY PATRICIA KEEFE
CW STAFF

SANTA MONICA, Calif. — IBM and Locus Computing Corp. last week announced plans to jointly develop the IBM Personal System/2 AIX operating system, which was first announced during IBM's April 2 unveiling of the PS/2 line.

The Unix-based PS/2 AIX has been characterized by some industry observers as a strategic, multiuser, multitasking operating system designed to encourage corporate users to purchase the soon-to-be-released PS/2 Model 80, which is based on Intel Corp.'s 80386 microprocessor.

Locus President Gerald Popek stressed the significance of IBM's categorization of a 386-based Unix — specifically, its PS/2 AIX — as a strategic Program Product. "In IBM parlance, this means, 'Mr. Customer, you can base strategic plans on PS/2 AIX, because we'll support and maintain this product for years,' " he said.

Popek claimed that previous Unix-based products from IBM have been offered at the other extreme as if IBM were saying, "Here's some software; use it, but don't call us about it."

### Partnership public

The announcement was also the first public acknowledgement of a now 4-year-old development agreement between Locus and IBM. PS/2 AIX is the first product to result from that partnership, Popek said.

"You might imagine there are more to come," he said, adding that Locus will unveil more details next week.

The new operating system is based on AT&T's Unix System V, Release 2 and will run on the PS/2 Model 80. PS/2 AIX will support Microsoft Corp.'s MS-DOS 3.3 as a task under Unix and includes LX Windows capability, a new Locus product based on the X-Windows standard, Popek said.

IBM has said it will announce pricing and availability in the fourth quarter. LX Windows allows most personal computer-compatible applications to run in a window without modification, Popek said. LX Windows is neither Microsoft Windows compatible nor a clone, he said, adding that "the right environment to track is IBM's Presentation [Manager] layer." Popek hinted at future support for IBM's OS/2 running as a task under Unix. While he said that "nothing is being said about OS/2 support," he did point out that OS/2 is an important part of IBM's strategic plan.

The PS/2 AIX software is a subset of, and compatible with, its predecessor, AIX RT Personal Computer, which was co-developed by IBM and Interactive Systems Corp., a Locus rival and neighbor in Santa Monica. However, PS/2 AIX reportedly will not run just as it is on IBM's RT Personal Computer.

### Buy while you wait

But to analysts, the key to PS/2 AIX, or any 386 Unix port, lies in its ability to provide users with a multiuser, multitasking virtual operating system — and, hence, a reason to buy the PS/2 Model 80 — while they wait for delivery of applications designed for IBM's OS/2.

For example, Xenix 386 is available immediately from Microport Systems, Inc. in Scotts Valley, Calif. "That's the whole point of Xenix [or any versions of Unix] right now," said Bruce Steinberg, director of marketing communications for Xenix developer Santa Cruz Operation in Santa Cruz, Calif. His company said it will announce PS/2 ports of Xenix this week.

There is also speculation that OS/2 will be late and that IBM is trying to cover its bets. "Is IBM announcing [PS/2 AIX] because they are behind Unix or because OS/2 is going to be real late?" asked David Fiedler, publisher of Infopro Systems' "Unique," a Unix newsletter. "IBM might be saying, 'Do we want to end up in the position of having all these great products [in the PS/2 series] but no software to take advantage of it?' "

This is critical, said Brian Boyle, an analyst with Novon Research in Berkeley, Calif. "The only reason you'd buy a 386 PS/2 is for multiuser — multitasking at the very least," he said. "People have to have some reason, other than just faster Intel 80286-based MS-DOS, to buy a 386 machine."

PS/2 AIX is also said to be positioned against Microsoft's VP/IX, which was recently licensed from Interactive Systems. Interactive Systems has agreed to customize VP/IX, which supports MS-DOS as a task under Unix, to support MS-DOS under Xenix.

The Locus-IBM partnership also raises questions about IBM's long-standing public relationship with Interactive Systems. IBM has co-developed or licensed four Unix products from Interactive Systems: IX/370 and VM/IX for IBM mainframes, PC/IX for IBM's PC and AIX for the RT PC. When asked whether Locus was replacing Interactive Systems as IBM's Unix supplier, Popek said, "This release sure shows where IBM stands." Efforts to reach Interactive Systems President Ronald Fisher and Vice-President Bernie Hill for comment were unsuccessful.

# Competition

FROM PAGE 1

fore with the rates that Fortune 150 companies require. Granted, there will be fewer players, but the competition is there."

### Life after tax reform

The leasing industry's consolidation (see chart) has hastened dramatically since the U.S. Congress repealed the investment tax credit last year.

Parent leasing firms, financial institutions or regional Bell holding companies provide formerly medium-size lessors with the substantial capital needed to keep their hardware portfolios stockpiled. After tax reform, the smaller firms lost much of their ability to raise capital by selling the tax advantages of lease deals to investors.

Notable examples of this trend include the sale of UK-based United Leasing PLC and its U.S. subsidiary, Unilease Computer Corp., to The Meridian Group; Bell South Corp.'s acquisition of Dataserv, Inc.; and the proposed buy-out of CMI Corp. by Continental Information Systems Corp., which faces a court challenge from CMI President Edward Cherney [CW, June 1].

"Computer leasing is shifting from a very entrepreneurial industry to an oligopolistic one," says Harvey Kinzelberg, chairman of The Meridian Group. The top 10 lessors — currently controlling 35% to 40% of the U.S. leasing market — will claim an 80% market share within four years, according to Richard Kazan, president and chief executive officer of Capital Associates International, Inc. But unlike other industries, in which a shrinking vendor community can result in higher prices, the traditionally aggressive competition in computer leasing is expected to continue even after a major shakeout.

"God forbid you lose market share," Kinzelberg says. "It's cutthroat out there."

The competitive arena in leasing is shaped by many other factors in addition to the number of lessors competing for a given deal. Lease rates have not increased as much as feared after tax reform, lessees say, because residual values — the forecasted resale price of a used CPU or peripheral when its lease expires — have gone up. Since the lessors' profit margin is a combination of the lease rate and the remarketing value of the equipment, a lessor using higher residual forecasts can set rates more aggressively.

IBM Credit Corp., which sets market parameters at the high end, is fueling competition with that residual-rate formula, according to Al Schwanter, manager of computer operations analysis at United Technologies Corp.

"IBM Credit is turning up the heat; I'm amazed at the residual positions they take," Schwanter says. "As a result, I've seen much more creative leasing deals being talked about by major independent leasing companies."

Most lessors and industry watchers say that regardless of industry consolidation, there will be plenty of lucrative niche opportunities for small regional or specialized lessors. "There are firms doing good business on leases for the IBM 8100," says Wally Papciak, senior vice-president of market research firm Computer Intelligence Corp. "That may not be something that a real large company wants to bother with."

"The little guys will survive with what I call 'economies of small' — lower overhead," says Bill Fleischman, assistant vice-president of Equitable Bank. Large corporate accounts that solicit many lease bids from both large and small lessors, however, may see a negative impact from the industry consolidation.

"I would rather see more people out there to deal with, as long as they're reputable," says Randy Henning, senior purchasing agent for McDonnell Douglas Aerospace Information Services. "We're not really typical; we have shunned IBM Credit to do business with $1 million companies that were able to win the bid. I think those companies will get swallowed up, and it will be harder to cut good deals with large leasing conglomerates."

## Consolidation and shakeout

*Acquisitions in U.S. computer leasing industry, 1987*

| *Acquired company* | *Price* | *Buyer* | *Seller* |
|---|---|---|---|
| **CMI Corp.** | $50 million | Continental Information Systems Corp. (pending outcome of lawsuit by CMI executives) | Torchmark Corp. and Stephens, Inc. |
| **Equitable Life Leasing Corp.** | About $290 million | Lomas & Nettleton Financial Corp. | Equitable Investment Corp. |
| **Thomas Nationwide Computer Corp.** | $25 million to $40 million | Pacificorp | Thomas Nationwide |
| **First National Capital Corp. (certain assets)** | Undisclosed | McDonnell Douglas Finance Corp. | First National Capital |
| **United Leasing PLC/Unilease Computer Corp. (U.S. subsidiary)** | $80 million | The Meridian Group | United Leasing |
| **Huron Leasing, Inc.** | $4 million | Investor group headed by former Huron executive | Neti Technologies, Inc. |
| **Michael K. Vargo, Cos.** | Undisclosed | Econocom-USA | Michael K. Vargo, Cos. |
| **Greyhound Capital Corp. (October 1986)** | $140 million | Bell Atlantic Corp. | Greyhound Corp. |

CW CHART

# Fortune renamed

BELMONT, Calif. — The seven-year life of Fortune Systems Corp. came to an end last Wednesday when the firm completed the sale of its supermicrocomputer hardware business and officially renamed itself Tigera Group, Inc.

Fortune Systems said it has completed the previously announced sale of its hardware operations to SCI Systems, Inc. for $15.5 million.

SCI Systems is a supplier of components and electronic equipment based in Huntsville, Ala.

Tigera Group reportedly will continue to market and support Fortune Systems' line of office automation software. That line includes products such as Fortune:Word, which will now be marketed under the name Word Era.

Former Fortune Systems President James S. Campbell, who will serve as president of Tigera Group, said in a prepared statement that the new company will attempt to expand its line of office software through acquisitions.

## CORRECTION

Version 3.1 of Jnet from Joiner Associates, Inc. in Madison, Wis. [CW, June 29], is priced from $7,000 to $23,500.

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*General Manager, Manufacturing*

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# DMS 100 architecture to open

*Northern Telecom counts on Bells offering info services*

BY ELISABETH HORWITT
CW STAFF

Anticipating that the regional Bell holding companies will eventually receive regulatory approval to offer information services, Northern Telecom, Inc. is expected this week to open up its DMS 100's architecture so that local carriers can develop their own software for the central-office switch.

A Northern Telecom spokesman told *Computerworld* that the DMS 100's proprietary architecture, which currently runs only the vendor's internally developed software, will be changed "to allow the telephone companies to develop their own applications" that will support future information services.

U.S. District Judge Harold H. Greene last week heard comments from industry and users groups on whether to lift the ban on the regional Bell holding companies offering such services (see story page 1).

While Northern Telecom has revealed that it intends to open the DMS 100's architecture, the company is said to be announcing products that will make this happen and to be "keeping a lid on" the nature of such offerings, according to Peter Bernstein, senior research analyst at Probe Research, Inc.

### Bells wary

The regional Bell holding companies may be leery about committing their information processing systems to a central-office switch from Northern Telecom or any other vendor, Bernstein said.

Ameritech, for example, is reportedly working with Digital Equipment Corp. on a separate computer-based "feature node" that would "give smarts to the central-office switch" for information processing purposes, he said. By implementing intelligence apart from the switch, the firm would be able to develop information-service offerings without being dependent on what protocols and features a company like Northern Telecom or AT&T decides to offer, he noted. Ameritech already has the facilities for developing feature-node software through its subsidiary ADR Services, Inc., he added.

A next step for carriers will be to link their central-office information services with existing applications on customers' on-site computers, said John Walsh, managing director of New York consulting firm Integrated Strategies Group, Inc. "I think the next-generation private branch exchange will be a hybrid that perhaps runs Unix or [DEC's] VMS and communicates with the central-office switch," Walsh said.

National Advanced Systems

GTE Communication Systems connects with National Advanced Systems

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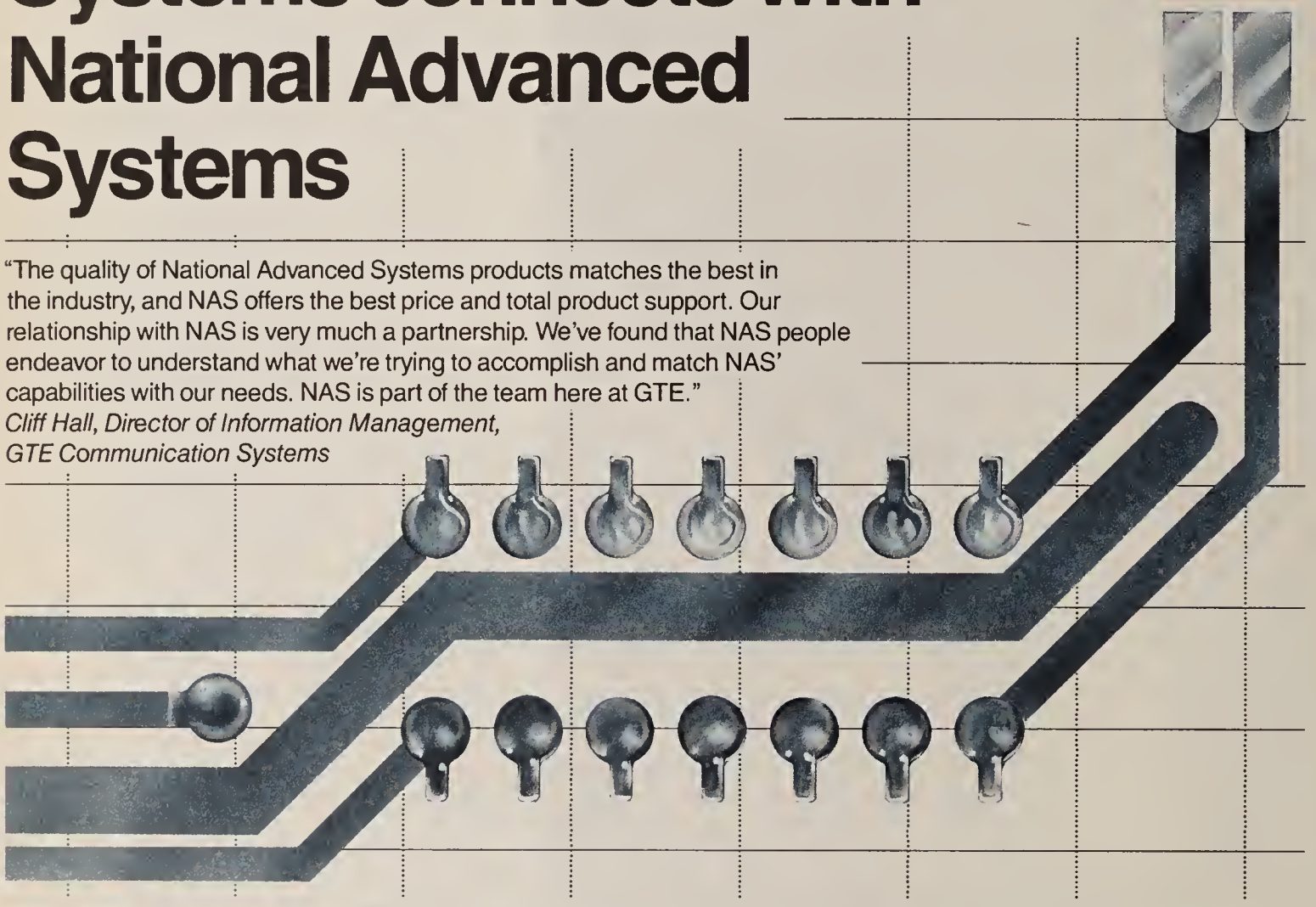
*Cliff Hall, Director of Information Management, GTE Communication Systems*



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# Hitachi adds two supers

BY YASUKO YOSHIMI
and LORI VALIGRA
IDG NEWS SERVICE

TOKYO — Hitachi, Ltd. last week announced two high-end supercomputers that it said are faster than the most powerful Cray Research, Inc. models.

The Models S-820/80 and S-820/60 operate at up to 2 billion floating-point operations per second (GFLOPS) and 1 GFLOPS, respectively. The performance is more than double the speed of Hitachi's existing Model S-810 supercomputers.

Hitachi positioned the products against top-of-the-line models from Fujitsu, Ltd. and NEC Corp., claiming that the fastest Cray-2 supercomputers, whose peak performance is also estimated at 2 GFLOPS, are slower.

A Hitachi spokesman said the company expects to book 60 orders in Japan for the S-820s during the next five years. Meanwhile, the company has already shipped 14 of its 18 orders for the S-810s. Hitachi said it is interested in marketing the new models overseas but did not disclose details. Fujitsu and NEC have made agreements with Amdahl Corp. and Honeywell, Inc. to distribute Fujitsu and NEC supercomputers in the U.S., although only one of those systems — a NEC SX-2 at the Houston Area Research Center — has been installed in the U.S.

Included in the S-820 machines are technologies designed to boost system speed, such as vector-register large-scale integration parts that boast 2.5-nsec access times. The system reportedly includes two integrated extended storage units that hold 3G to 12G bytes of information.

The primary applications for the models are semiconductor design, structural analysis and weather forecasting. The object code from the three existing S-810 models will run on the S-820s, according to the vendor.

The Hitachi spokesman said the S-820 models will be available in the first quarter of 1988. Monthly leases for the S-820/80 and S-820/60 reportedly will begin at $552,000 and $393,000, respectively. Even though there have been orders for 65 supercomputers in Japan, International Data Corp. of Japan noted, only a small percentage of those orders will ever actually be installed.

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| | Tucson | Aug 26 |
| CA | Lafayette | Jul 30, Sep 24 |
| | Los Angeles | Jul 16, Aug 13, Sep 8, Sep 30 |
| | Newport Beach | Jul 21, Sep 17 |
| | Sacramento | Aug 13 |
| | San Diego | Jul 30, Sep 10 |
| | San Francisco | Jul 21, Aug 18, Sep 15 |
| | San Jose | Jul 9, Aug 6, Sep 2 |
| CO | Colorado Springs | Jul 16, Sep 17 |
| | Denver | Jul 14, Aug 13, Sep 15 |
| CT | Hartford (Farmington) | Jul 23 |
| | New Haven | Jul 28 |
| DE | Wilmington | Jul 9, Sep 1 |
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| | Tampa | Sep 10 |
| GA | Atlanta | Jul 8, Sep 16 |
| | Macon | Aug 13 |
| HI | Honolulu | Sep 17 |
| IA | Des Moines | Jul 15, Sep 17 |
| IL | Chicago | Jul 14, Aug 19, Sep 15 |
| | Springfield | Aug 11 |
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| KS | Wichita | Aug 4 |
| KY | Louisville | Sep 10 |
| LA | Baton Rouge | Jul 23 |
| | New Orleans | Aug 21 |
| MA | Boston | Jul 16, Aug 25, Sep 10 |
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| | Springfield | Sep 16 |
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| MD | Baltimore | Jul 28, Sep 3 |
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TRBA

# Harris boosts power on supermini line

BY JAMES CONNOLLY
CW STAFF

FORT LAUDERDALE, Fla. — Harris Corp.'s Computer Systems Division last week extended its H Series of real-time superminicomputers with multiprocessor versions that reportedly provide up to three times the power of earlier H Series high-end systems.

The H Series is a family of 48-bit systems that was designed for use in real-time simulation and precision scientific and engineering applications such as aerospace engineering, trainer simulation, compute-intensive research and process control.

The multiprocessor models are the dual-processor H-1500, which the company has rated at 10 million instructions per second (MIPS) using Whetstone benchmarks, and the triple-processor H-1600, which Harris has rated at 15 MIPS. The previous high end of the H Series was the 5-MIPS H-1200.

### Compacts stand alone

The company also announced two compact uniprocessor models that can be used as stand-alone systems or in combination to form an H-1500 or H-1600.

The H-900 and H-1100 were designed to provide comparable power while occupying one-half the footprint of the earlier H-1000 and H-1200.

The systems utilize emitter-coupled logic technology-based gate arrays and memory subsystems. They support up to 12M bytes of memory per CPU and feature dual memory buses.

They run Harris's RT-VOS, VOS and VUE operating systems.

In addition, the systems run RT-VOS/MP, which Harris announced last week.

According to Rick Maule, director of product marketing for Harris, RT-VOS/MP includes scheduling tools and tracking and maintenance functions that are intended to allow users to concentrate on their applications.

RT-VOS/MP also reportedly provides a single point of control for a closely coupled multiprocessor complex of up to 12 CPUs. That control allows centralized system loading, configuration, task scheduling, synchronization and diagnostics from a single operator console, Maule said.

The H-1500 is priced from $555,000. The H-1600 has a starting price of $795,000. Entry-level prices for the H-900 and H-1100 are $240,000 and $260,000, respectively.

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# California computer bill stalled

BY JEFFRY BEELER
CW STAFF

SACRAMENTO, Calif. — A proposal to toughen the state's computer crime statutes failed last week, at least temporarily, to clear what its proponents regard as its most crucial legislative hurdle en route to ultimate enactment or rejection.

By only one vote, Senate Bill 255 (SB 255) fell short of winning approval in the California Assembly's Public Safety Committee.

During a June 29 hearing, the committee granted a continuance to SB 255's author, state Sen. Ed Davis, and directed his staff to rephrase the bill by July 13 to address last-minute objections by a labor union representing office employees.

"We have reasonable prospects of being able to devise some language that would amend the bill to make it acceptable both to its opponents and supporters," said Charles Fennessey, Davis's legislative consultant. "The problem is to satisfy everybody's concerns without requiring a redefinition of embezzlement and petty larceny under the state's penal code."

Even if it survives its next encounter with the Public Safety Committee, SB 255 still must go before the full California Assembly and then the governor before it can be signed into law.

If the bill becomes law, almost any systems security breach would be deemed a felony — and punished accordingly — even if no assets were stolen during the attack and its data remained undamaged [CW, June 22]. Under existing California law, violations are considered illegal only if intended to cause harm.

During hearings last week, the Teamsters union, which represents a variety of clerical employees, raised the possibility that the proposed law would make illegal common office practices that are seldom condoned but which it said are too trivial to warrant prosecution.

Barry Broad, the union's legislative counsel, cited the example of employees who use their companies' mainframe resources to draft personal resumes. "To treat such misconduct as a felony is absurd because nothing of value is taken," Broad said.

# Microsoft loses Taiwan piracy battle

BY TOM MCHALE
and BEN LIM
IDG NEWS SERVICE

TAIPEI, Taiwan — Microsoft Corp. suffered a major setback recently in a bid to end alleged counterfeiting of its MS-DOS operating system by Taiwanese manufacturers. Taipei District Court handed down a verdict of not guilty in June to three defendants in the vendor's case against Evergood International.

The court's decision sets a precedent for other cases that are pending, and Microsoft is expected to appeal the ruling in Taiwan's High Court. The case has broad implications for Taiwan's computer industry, as Microsoft is reported to have warned more than 200 companies of impending legal action.

The District Court concluded that Microsoft had licensed MS-DOS technology to U.S.-based Falcon International, which had, in turn, licensed manufacturing rights to a Hong Kong company referred to in court as M.U.L. The Hong Kong company is said to have received permission from Falcon to authorize the manufacture of the operating system software in Taiwan, Singapore and Australia.

Documents verifying the contracts were produced in court, and the judge maintained that they prove an absence of criminal intent by Evergood.

Sources said Microsoft did not seek damages from the Taipei company but that it had asked the judge for severe punishment of Evergood if that company did not cease production of the operating system.

Microsoft reportedly also will petition other courts in Taiwan and the U.S. to continue impounding copies of MS-DOS from Evergood and other allegedly unauthorized Taiwan makers while the appeal is in progress.

# IBM typing system out

BY ALAN J. RYAN
CW STAFF

NEW YORK — IBM announced last week its Personal Typing System, which it described as "the merger of the typewriter and computer," and an application package that reportedly gives its Personal System/2 Model 30 computer the capabilities of the typing system.

Analysts said the system amounts to little more than a packaging variation that targets the PS/2 Model 30 at the secretarial market and expressed doubt as to how much demand there will be for such a product.

"Historically, personal computers aimed at secretaries are not something people have lined up to buy," said William Zachmann, vice-president of research at International Data Corp. in Framingham, Mass.

"It seems to us that the day of dedicated word processing has passed," said Bruce Jenkins, an editor at Daratech, Inc., a market research firm in Cambridge, Mass. The Personal Typing System "is going to be a tough sell," Jenkins added.

Four models of the typing system were announced. Each model reportedly consists of a system unit with an Intel Corp. 8086 microprocessor, keyboard, color or monochrome display, impact or nonimpact printer and software.

The new system is "basically a way for IBM to sell the Model 30s through its typewriter dealers," Zachmann added.

The suggested single-unit purchase price for the Personal Typing System Model 1, which includes a system unit and keyboard, software, a monochrome display and an impact printer, is $2,895.

Solutionpac Personal Typing is scheduled to be available later this month and will sell for $1,575 with the Correcting Wheelwriter Printer and $1,975 with the Correcting Quietwriter Printer.

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# Millenium to offer DB2-CICS tie

*Version bridges system gap, allows flexibility in development and use*

BY CHARLES BABCOCK
CW STAFF

NATICK, Mass. — McCormack & Dodge Corp. is preparing a version of its Millenium SDT development environment that it claimed will allow users to develop and run production applications for IBM's DB2 under CICS.

Current users of DB2 must rely on IBM's TSO if they want to use IBM's Query Management Facility or run on-line interactive queries.

To run transaction processing, they must switch into CICS, according to John Birch, vice-president of M&D's Distributed Systems Business Unit.

### A combination

"In effect, we combine both. You need to use only one development environment to fully develop any production application," said Barrett Williamson, director of DB2 development efforts at M&D.

Company officials disclosed the nature of the $110,000 product in a background briefing last week. In effect, what is now known as M:SDT DB2 will be a Millenium application that will support DB2 application development around the existing Millenium platform, the firm said.

That platform includes the procedural definition fourth-generation language called PDL and nonprocedural facilities to define data, screens, queries and other system elements, create data base records, paint screens, create windows and impose multilevel security.

M&D said it has about 400 licensed customers of the 3-year-old SDT technology.

The applications developed with SDT DB2 will also be able to use IBM's VSAM files, a feature that Birch said will help ease the transition to DB2 by many large users. Other features include the following:

- Use of eight screens in SDT DB2 to develop SQL-based applications.
- A query answer screen to allow a programmer to set up SQL statements behind a screen to answer English-like questions raised by a user's prompts.
- An interactive SQL screen to help a programmer compose SQL statements.
- A report-formatting screen that allows a programmer to preformat the rows and columns of a report; up to 32K bytes of data may be placed in a row.

The programmer can select a column and shift it to the left or right until it sits alongside another column with which it must be associated for a particular report, Williamson noted.

The report formatter can also employ control breaks, totaling a set of numbers at a predesignated point or highlighting minimums or maximums.

### Tightly integrated

The SDT development system is tightly integrated with DB2, M&D officials claimed. "We populate our control tables and dictionary straight from DB2," Williamson said.

PDL is an interpretive fourth-generation language with which an application prototype may be constructed.

For efficiency purposes, most of a finished SDT production application built with the Millenium facilities will be composed in assembler and Cobol, with a few customized programming parts employing PDL, according to Birch.

M&D used the original Millenium to develop its integrated set of accounting applications and later offered Millenium SDT as a development environment.

Applications developed with Millenium SDT are able to share data and files with other M&D applications, the firm said.

The Millenium platform itself is provided at no cost to any customer of the vendor's applications.

# HP hikes prices by 2%

BY JEFFRY BEELER
CW STAFF

PALO ALTO, Calif. — Hewlett-Packard Co. last week raised by an average of 2% the list prices for a broad assortment of the company's storage and output devices.

The price hikes affected HP's cartridge tape subsystems, reel-to-reel tape units, system printers, disk modules, terminals and 1000 series factory-automation processors, according to a company spokesman.

Not affected by the adjustments were the vendor's personal computer family, third-party PC software, ink-jet printer line and 3000 series commercial processors, including HP's Precision Architecture machines, the spokesman said.

The increases are already reflected in the firm's latest price lists, but any user who orders equipment before August will still be charged under the old pricing structure, HP said.

Last week's development coincided with a preholiday lull, when many users customarily take their vacations. It ended a protracted period of HP pricing stability.

"The last time we announced a wide-ranging increase of this kind was in late 1984," the spokesman recalled. Since then, he added, "the business climate has been fairly sluggish. But recently, general economic conditions have improved to the point where we now feel we can afford to pass along a modest price increase that reflects our growing expenses."

For reasons not directly related to the rest of its July 1 announcement, HP said, the vendor also boosted prices for its Laserjet Series II and Laserjet 2000 printer families by an average of 1%.

In the wake of the price hikes, a Laserjet Series II that formerly cost $2,495 will now sell for $2,595. Prices for the $21,495 Laserjet 2000 Model P and $24,995 Model D were raised to $21,995 and $25,695, respectively.

Unaffected by the price changes were the Laserjet 2000 Model A and the mid-range Laserjet 500 Plus, which still costs $4,495.

### Falling dollar to blame

The factor that is said to have necessitated the increases in the Laserjet families' prices is turmoil on the international currency front. The falling value of the dollar, relative to the yen, has increased the cost of the Laserjet's Japanese-made parts, the HP spokesman said.

Although the rise in the printer line's prices will do nothing to engender goodwill within the vendor's customer base, the move is unlikely to have serious repercussions, according to HP user Charles Shimada, systems manager for Account-a-Call Corp. in Los Angeles.

"On the Laserjet 2000 side, in particular, a price increase of only $500 to $600 may make purchases a little harder to justify," Shimada said. "But it's not enough to upset any planned acquisitions." Shimada's comments about the Laserjet family applied equally to the rest of HP's repriced products.


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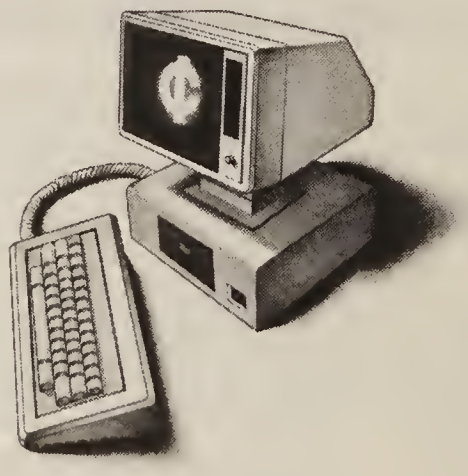

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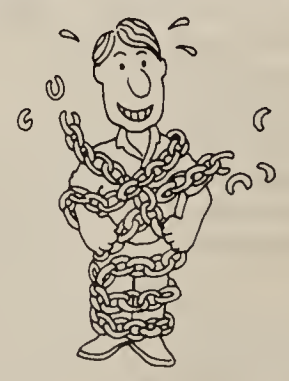

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# FBI info system expansion assailed

*Civil libertarians call planned data base growth, other agency links a threat to privacy*

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Federal Bureau of Investigation is mulling over a recent proposal to dramatically expand its criminal information system, while civil libertarians charge that the plan is a "major threat to citizen privacy."

The Advisory Policy Board to the FBI's National Crime Information Center (NCIC) recommended that the NCIC be modernized to include on-line links to data bases at the Securities and Exchange Commission, the Social Security Administration and other federal agencies.

In addition, the board's preliminary NCIC 2000 plan would create a new data base to help law enforcement authorities track the movements of criminal suspects across state lines. The data base could include anyone under investigation by police.

### High-tech detection

Law enforcement officials said the FBI should apply the latest computer technology to improve the NCIC's capabilities in order to meet public demands for catching criminals.

Jerry J. Berman, chief legislative counsel to the American Civil Liberties Union, however, said the proposal would allow authorities to create "electronic dossiers on citizens" and could easily be abused.

According to Berman, "The FBI used the NCIC in this way to track antiwar and civil rights demonstrators in the early 1970s until it was disclosed to the public and condemned by members of Congress."

He urged Congress to enact legislation restricting the NCIC to information already on the public record, such as arrest warrants, stolen property reports and criminal history records.

Rep. Don Edwards (D-Calif.), chairman of the House Subcommittee on Civil and Constitutional Rights and a frequent opponent of expanding the NCIC, is planning to hold hearings on the issue in the fall, an aide said.

### Under consideration

In response to the criticism, the FBI issued a statement that said the advisory board's recommendations "will be reviewed at the highest level of the FBI, to include review by Acting Director John Otto, prior to any final decisions being made. Congressional concern regarding these issues will be fully considered."

The FBI said it hopes to finish the NCIC 2000 system design and issue a request for contract bids next year.

Lloyd A. Smith, manager of Oregon's criminal justice information system and a member of the NCIC advisory board, said the interests of police and privacy advocates will have to be balanced, "if the public expects the police to do investigations and be efficient and catch criminals.

"Most of the things we're talking about are relatively innocuous compared to what other government agencies already know about us," Smith said. But the NCIC system should be subject to appropriate data-integrity controls and access controls, he added.

The latest controversy about the NCIC was touched off last month when the 30-member advisory board approved a preliminary plan for modernizing the center's 20-year-old information system through the year 2000.

### Longer arm of the law

Among the approved recommendations was one to create a new data base for tracking the movements of individuals on parole or probation, convicted terrorists, foreign spies, vehicles "of investigative interest" and those who are the subjects of any criminal investigation.

The board's proposal for NCIC 2000 would also establish on-line linkage to numerous federal data bases, including Social Security records, immigration and passport records, the FBI's fingerprint files and files on financial securities, registered weapons and federal prison inmates.

In addition, the board supported the following recommendations for the expanded NCIC:

- List the "known group membership" of wanted individuals.
- Add misdemeanors and juvenile crimes to its criminal history files.
- Improve the search capabilities of its data base software to increase the number of "hits" from a query, such as by permitting inexact matches and allowing searches by nickname and by modus operandi.
- Add the ability to transmit photographs, fingerprints, signatures and other images.

Apparently aware of the privacy concerns, the advisory board rejected a proposal to track "associates" of criminal suspects. It also rejected a proposal to obtain on-line access to private data bases, such as credit bureaus, airline passenger lists and telephone records.


*DATELINE: NEW YORK*

# Executive confesses to computer collaboration using In-Synch!

John Merson, noted microcomputer industry executive, has confessed to using IN-SYNCH for the purpose of computer collaboration. This is the first public statement in what appears to be the rapid proliferation of IN-SYNCH-based co-computing throughout industry and government.

## Collaborating the Easy Way

In an exclusive interview, Merson recounted his actions, from his first co-computing session to his full-blown use of IN-SYNCH. "It started innocently enough," Merson said. "My partner, who was working in our branch office, needed help drafting a proposal for a prospective new client. With IN-SYNCH, we were able to work together, in real-time, on a WordPerfect document as well as a 1-2-3 spreadsheet. We even developed an AutoCAD drawing and threw in some ChartMaster graphs to spice up the proposal. IN-SYNCH made co-computing easy and quick—just as if we were sitting side-by-side. No fax machines. No overnight mail. No special networking. Just our modems and the regular phone lines."

## Collaborators Get Carried Away

According to Merson, the computer collaboration didn't stop there. "I guess I got carried away," admitted Merson, "but it was amazing what we could do with IN-SYNCH." Apparently, Merson and his partner next used IN-SYNCH to prepare a slide presentation, using screens selected from the proposal they had developed. These sequenced "slides", including text, drawings, graphs and spreadsheet data, were then shown PC-to-PC (again using IN-SYNCH) to their prospective client. "The prospect had IN-SYNCH on his PC too," continued Merson, "so we dialed him up and delivered our sales pitch online. He loved it! Said it was just the kind of state-of-the-art stuff he needs in today's fast-paced business world. We beat out the competition and got the job."

## Collaborating and Proud of It

Merson showed little remorse. "You'd do the same thing if you saw IN-SYNCH. This co-computing is going to catch on like crazy. The possibilities are too hot to ignore. You can co-run all the popular PC software packages. You can transmit and annotate "snapshots" of screen displays. Develop, save and present "slide shows." And IN-SYNCH keeps "minutes" so you've got a complete audit trail of everything you've done. Managers, engineers, programmers, sales people—they're all going to be co-computing with IN-SYNCH. I just did it first. And I'll certainly do it again. And again!"

## Poll Shows Collaboration Spreading

Results of an unofficial poll taken by this reporter show Merson's prediction to be proving true. An inside source at MCI stated, "We use IN-SYNCH all the time to analyze important revenue data. It eliminates the need to express diskettes between headquarters and remote branches." And according to a highly-placed source at Rockwell International, "We're using IN-SYNCH for software development as well as for the training of new PC program users." In perhaps the most stunning admission, the president of Engineering Computer Services, Inc. said, "We're using IN-SYNCH with AutoCAD to help designers and clients review architectural drawings, thereby expediting schedules and cutting costs."

## Cheers for Collaborators

According to a spokesman for AVTC, producer of IN-SYNCH, the company will not press charges against Merson. "We knew when we released IN-SYNCH that it was the first and only product to bring teleconferencing to the desktop of every PC user. With an innovative product, you've got to expect innovative uses. Off the record, well, frankly we're delighted and we'd just like to say: keep on collaborating!"

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# Micro Channel card rings up $2.5M

BY JAMES A. MARTIN
CW STAFF

FREMONT, Calif. — Orchid Technology, Inc. last week claimed it has won the first victory in the IBM Personal System/2 Micro Channel enhancement board competition with some $2.5 million in orders for its Ramquest 50/60, the first such board to hit the market.

Orchid jockeyed to beat formidable competitors such as AST Research, Inc. and Quadram Corp. into the market created by IBM's PS/2 announcement in early April. Orchid said that entering the PS/2 market first was of paramount importance in obtaining a strong position in the market.

The company said interest in its card has created record sales for a single product in its first month on the market. Orders for the product are 15% higher than Orchid had anticipated, and manufacturing efforts have been doubled to meet demands, according to Bill Berkman, product manager.

Ramquest has been exceeding expectations because of its position as the first add-in memory card for the PS/2 Micro Channel models, Berkman said. AST and Quadram reportedly have similar products scheduled to begin shipping this summer.

Analysts disagreed over the importance of Orchid's being first to market. "It can give them a pretty strong opportunity," said Tim Bajarin, executive vice-president of Creative Strategies Research International, a Santa Clara, Calif., microcomputing consulting firm. "The noise made about the first product has great public relations value, and it can build momentum that will carry over into other products."

"Being first to market with a Micro Channel add-on memory board doesn't mean that much," said Richard Shaffer, a microcomputer industry analyst and editor and publisher of "Computer Letter" in New York. "Memory is a commodity, and although Orchid might make a little profit on it for a while, the real opportunities will be in the area of communications and graphics enhancement cards."

The current lack of a sizable installed base for the PS/2 Models 50 and 60 and the expected competition from AST and others will soon lessen demand for Ramquest, Shaffer added.

Although Orchid would not say how many units have been shipped, Berkman said about 90% to 95% of the Ramquest orders will be shipped. Ramquest retails for $995 but is being discounted by as much as 42%, which means that between 2,500 and 4,000 will be shipped from current orders.

The announcement came two weeks after IBM's move to counter widespread skepticism about the success of the PS/2 series. IBM told analysts that approximately 250,000 PS/2 units have been shipped, along with a backlog of orders for 500,000 more units.

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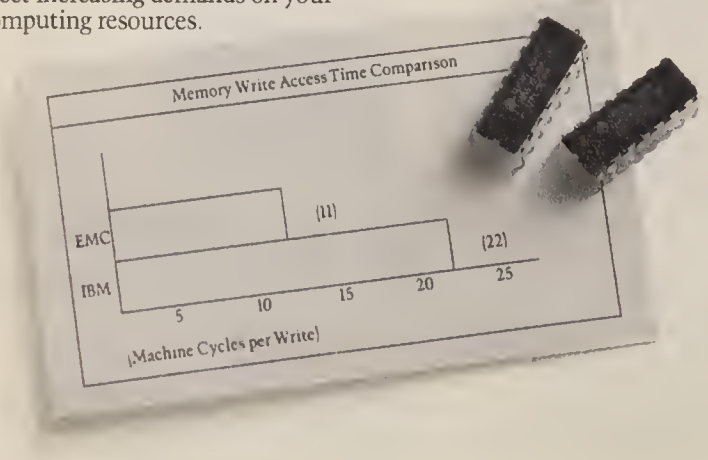


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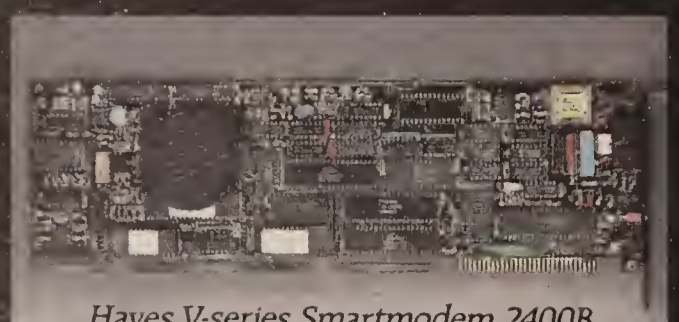

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## EDITORIAL

# Keeping on top

Vendors are salivating over projections of a $40 billion market in the early 1990s; their customers — manufacturing executives — are thrilled about the prospect of greatly improved productivity and the revival of export might. Yet, we are told, the promise of drastically revamping and modernizing the U.S. industrial base through computer-integrated manufacturing has generally failed to excite the imagination of MIS.

There are isolated cases where MIS has, willingly or otherwise, become closely involved in developing CIM strategies and processes, but it is clear to observers that, for the most part, engineers and manufacturing executives have played the leading role to date in automating the factory. That is both sad and perilous.

The likely revival in the next decade of the U.S. industrial giant holds for the creative MIS manager the potential to create a challenging career path, along with the opportunity to become a key player in mapping out corporate strategy. For MIS managers in manufacturing to overcome the obstacles barring most from the executive career ladder, it is imperative that they become involved in solving the top crisis facing their companies — production modernization through the use of computer technologies.

The danger that ignorance of CIM holds for MIS careers is the inevitable prospect that information systems personnel will, at a later point, be pressed into action to deal with the millions of lines of software code that will be required in the modern factory. Waiting to be called, rather than volunteering now, means dealing with the documentation and maintenance problems inherent in systems designed by professionals from other callings. These professionals may be more inclined toward one-stop solutions and less cognizant of the need for integration that MIS has abruptly and belatedly had to deal with due to the mass influx of the personal computer.

Technology has been a stumbling block to implementation of CIM, but it seems clear from recent demonstrations and the comprehensive overview of manufacturing software in this week's Spotlight section that technological hurdles are rapidly falling. The MIS manager who dreams of someday attaining that ever-elusive chief information officer status cannot stand idly by while his counterparts in the engineering and production departments grab avidly for the leading role in applying information systems technologies to the factory floor.

It may be comforting for many to beg off, claiming that there is still much work to be done in the automation of accounting systems. But for the manufacturing company that is unable to adapt automation to stave off competition, accounting systems will no longer be required. The CEO who is determined to lead his manufacturing concerns into the next century will turn to those managers most willing to trot along the unlighted path of automation, and it will be those managers whose stars will shine, whether they are from MIS or other departments.

## LETTERS TO THE EDITOR

### Premature piece

You recently printed two letters from readers pointing out your pro-IBM bias [CW, May 25]. One said that announcements of future products should not be treated as existing prototypes, and the other reminded you that companies other than IBM pioneered various fields that the giant later entered.

In the same issue, you had an article (page 108) not about existing products or planned products or announcements but about possible plans for announcements — by IBM, of course. And learned people vied to be the first to describe what will be announced.

If any other company made an announcement that it would later announce products that will come out in two years' time, you would not give that company a single column inch — unless it was to wonder whether it will be around that long.

*Harlan Rosenthal*
*Syncsort, Inc.*
*Woodcliff Lake, N.J.*

### Wait to divest

On paper, lifting restrictions on the divested Bell operating companies may look good. They already have a direct link to customers, so why not let them use it to provide enhanced information services? Why not let them expand into the business of manufacturing information technology products?

The fundamental problem is timing. Right now, there is no accounting system in place that addresses the coexistence of competitive and regulated businesses within the operating companies.

Given the current structure of the divested Bell companies, which use formulas involving profits and costs of business to set base rates for phone service, the introduction of an unregulated, competitive activity could have a profound effect on the existing regulated phone service.

The divested Bell operating companies could easily raise the consumer's phone bill to get the capital required to stray out of the local phone-service business and into long-distance, high-tech manufacturing and other related high-risk businesses.

In other words, the operating companies could cross-subsidize new, competitive operations with revenue from the local calling service.

At this time, there is no assurance that the divested Bell operating companies have laid the groundwork to move into competitive areas without disrupting their other basic services. Consumers should ask the courts to exercise restraint in lifting any restrictions on the Bell operating companies until there is such assurance.

*Oliver R. Smoot*
*Executive Vice-President*
*Computer and Business Equipment Manufacturers Association*
*Washington, D.C.*

### Unequal dollars

In 1960, when I graduated with a liberal arts degree, I entered the computer world with an excellent salary of $123 per week. An excellent salary in 1987 for the same education might be $723 per week.

If I were to use the logic you exhibited in the 20th anniversary edition [CW, June 1], I would be outraged that today's graduate is paid 487% more than I was. But of course, today's graduate is not — in purchasing power. One of your charts implied that the average cost of hiring a data processing professional today is 3½ times that in 1967. The numbers are meaningless.

You would have given meaning to the charts by indicating how many hours an average company operated and now operates to earn enough profit to hire a DP professional or how many company cars would be equivalent to 10 DP professionals or expense lunches or rolls of newsprint — but not dollars.

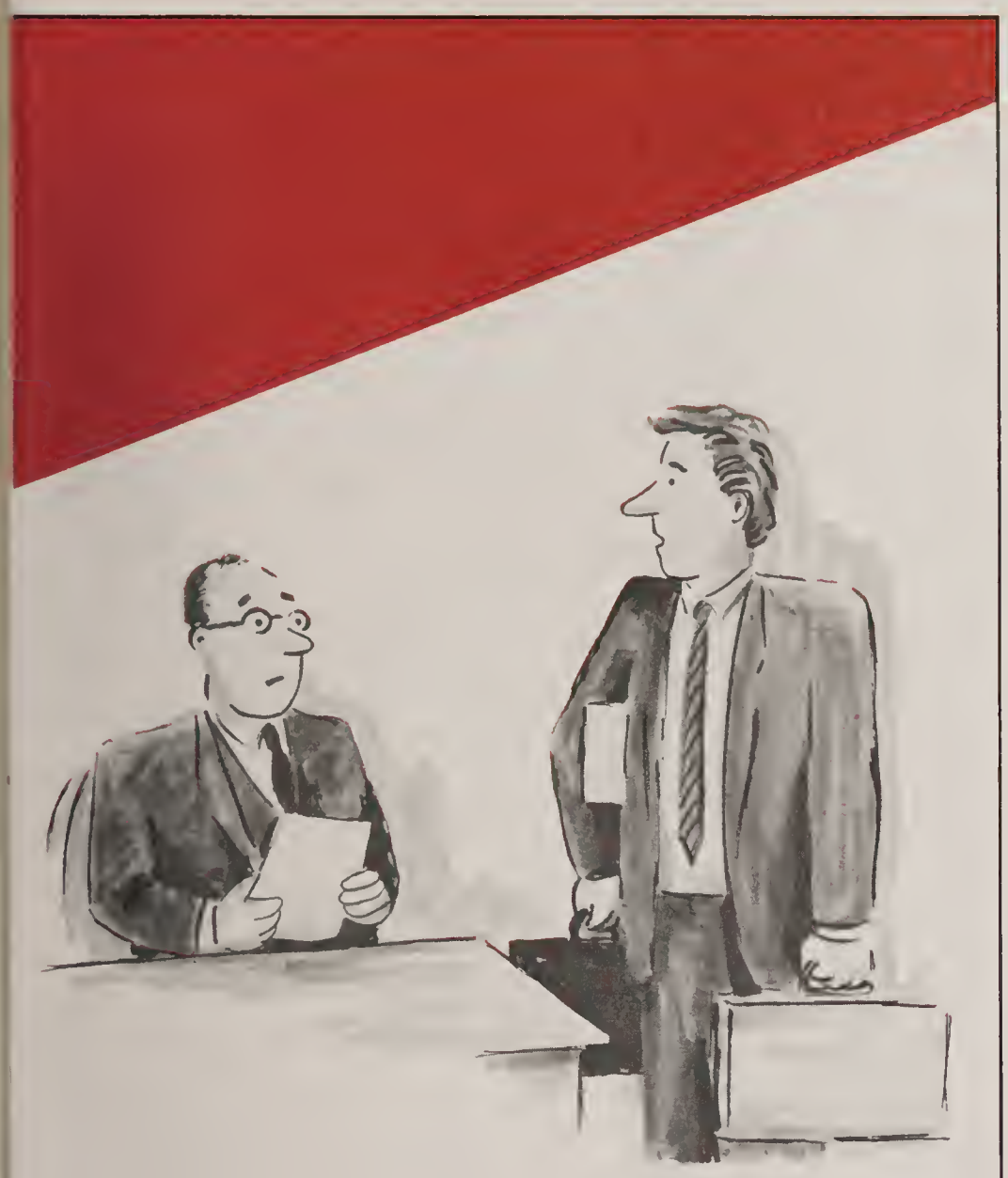
My 1947 5 cent candy bar is now 40 cents, but it is the same candy bar. It is the dollar that has changed. That is called inflation.

*Edward C. Caudill Jr.*
*Product Marketing Manager*
*Emulex Corp.*
*Costa Mesa, Calif.*

### This week in history

July 4, 1977
The first legislation aimed specifically at computer crime is introduced in the U.S. Senate by Sen. Abraham Ribicoff (D-Conn.). The bill would make it a crime to misuse the computer systems of the federal government, certain financial institutions and interstate commerce organizations and would punish offenders with up to 15 years in prison and/or a fine of up to $50,000.

July 5, 1982
A federal grand jury indicts Hitachi Ltd. and 14 of its employees on one count of conspiring to transport stolen IBM property — namely, IBM trade secrets.



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65. Communications Systems/Public Utilities/Transportation
70. Petro Chem, Mining, Construction, Agriculture
80. Manufacturer of Computers, Computer-Related Systems or Peripherals
85. DP Service Bureau/Software/Planning/Consulting
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95. Vendor: Other _____
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23. Dir., Mgr., Suprv., Analyst, of Systems
31. Dir., Mgr., Suprv., of Programming
32. Programmer, Methods Analyst
35. Dir., Mgr., Suprv., OA/WP
38. Data Comm. Network/Systems Mgt.

OTHER COMPANY MANAGEMENT
11. President, Owner/Partner, General Mgr.
12. Vice President/Asst. VP
13. Treasurer, Controller, Financial Officer

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SALES
51. Manufacturing Sales Reps., Sales/Mktg. Mgt.

OTHER PROFESSIONALS
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70. Medical, Legal, Accounting Mgt.
80. Educators, Journalist, Librarians, Students
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C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems
F. No Computer Involvement

338787-5

# Missing: Outer Join, referential integrity

SHAKU ATRE

IBM has come a long way as far as its relational data base products are concerned. In 1981 the company announced SQL/DS. Of course, that announcement didn't create much of a stir because SQL/DS supports only DOS/VSE and VM/CMS. Even if VM/CMS is inching toward MVS, the real revenue maker for IBM today is MVS.

Many of IBM's customers using MVS are Fortune 100 companies. With SQL/DS, IBM was putting its toe in the water to see whether the relational data base market would give the company a chill. It took IBM two years to deliver SQL/DS.

In the early 1980s, IBM was losing many data base product sales to competitors such as Cullinet Software, Inc. and Applied Data Research, Inc. IBM had to do something. After researching the possibility of providing a relational front end to IMS and announcing that capability as IMS/R, IBM realized that wouldn't work. Major IBM customers had already invested close to five billion dollars in IMS application development. The grand old lady IMS needed a face lift, which was provided by Fast Path.

**WITH about 1,300 installations in a two-year time frame, DB2 is here to stay. But IBM still has a long way to go to implement all the functions.**

However, the market was asking for relational. People were looking for some spiritual experience. In 1983, finally, IBM announced DB2. Why DB2 and not DB1? Was IMS DB1? What about SQL/DS — was it DB1? I'm not sure anyone knows, even inside IBM.

In 1985, IBM announced DB2 Release 1's debut — again very carefully, so as not to upset its customers' IMS investment — but how clever to say that IMS was still the production data base management system, and DB2 was just the information center tool. Of course, DB2 Release 1 wouldn't have passed the muster of the transaction rates needed in a number of organizations for the production applications.

Slowly IBM moved DB2 to center stage with Release 2 in 1986. IMS was orchestrated to take on, with its Fast Path Transaction Processing Facility (a reincarnation of the Airline Control Program, which was the guts of the American Airlines' Sabre system), the high-volume transaction environment.

However, a number of items were still missing in Release 2. What about the on-line performance monitor? What about referential integrity? What about an integrated and active data dictionary/directory that would support text, too? What about updates made to the views being transferred to the data base tables? What about the support of the date and time fields? What about a better integration of application programming tools? Of course, Release 3 must be imminent within a year.

Sure enough, on May 19, Release 3 was announced. VSAM transparency is provided. Time and date fields are supported. Performance is improved. A data base relational application directory that fulfills some functions of the many features in the catalog was announced.

But a number of features still remain to be supported. Referential integrity, an integrated and active data dictionary/directory, distribution capabilities of the data dictionary/directory, support of updates of the views passed on to the data base tables, reporting of matches with Join (but reporting mismatches with Outer Join) and, of course, a better integration of the application development tools, such as IBM's Cross Systems Product, Query Management Facility and Application System.

Does it mean the Information Center/1 and The Information Facility are put on hold? And what about interconnecting all of these with OS/2, extended with SQL and interfaced with Enhanced Communications Facility? Does that represent a piece in the crossword puzzle of Systems Application Architecture? How about all of these features, plus a performance improvement with Release 4 by end of this year, or at least early 1988?

With about 1,300 installations in a two-year time frame (a number expected to rise to 2,000 by the end of the year), DB2 is here to stay. But IBM still has a long way to go to implement all the functions.

Atre is president of Atre International Consultants, Inc. in Rye, N.Y., which provides consulting and training in data base and end-user computing environments.

# Let your talking do the talking

*The conclusion drawn from presentation graphics: Less is more*

NAOMI KARTEN

Sometimes it is difficult to know which is the problem and which is the solution.

Presentation graphics software makes it a breeze to create visuals. But in an increasing number of business presentations, especially at conferences, the visuals *are* the presentation — the talk is an afterthought.

Although a picture may be worth a thousand words, too many of these computer-generated visuals require a thousand extra *spoken* words to make sense out of them.

Ease of use, it seems, is not an unqualified advantage. The downside is that the easier graphics software becomes to use, the easier it becomes to pump out slide after garish slide that incorporates every conceivable feature simply because it's there.

In a recent presentation, a speaker displayed a slide that included three pie charts describing the company's success relative to its competitors. To say the slide was snazzy is an understatement. But was it readable? Was the company's message clear? Did the chart add anything to the narrative? No. The slide didn't highlight the company's success; it masked it.

To begin with, pie charts in turquoise, pink and magenta may be a decorator's delight, but they did not enhance this company's business image by one pixel. The pie charts were presented in three dimensions, which was at least one too many. Each pie was sliced into about a dozen sectors.

BOB DAHM

The labels were dark, squeezed onto the chart and generally undecipherable. When the speaker tried to explain the slide, *he* got confused. So the slide displayed to clarify the presentation first had to be clarified itself.

Visual wordiness is another consequence of the Personal Computer Age. At a conference at which sessions were offered twice, I listened to a speaker whose slides consisted of line after tiny line of text. For the audience, reading a detailed slide and simultaneously listening to a speaker can be difficult.

So I tried an experiment. I listened carefully to the speaker and ignored his slides. Then I sat through the repeat session and looked at the slides. Even knowing exactly what he was going to say, I was unable to both read the slides and absorb his spoken message.

Another speaker at this conference apparently assumed we were speed readers — not one slide was displayed long enough to read it.

### Vision tests

Too many visuals look like a test for 20/20 vision. In setting up for a presentation at a recent conference, a speaker projected a test transparency. As he was asking whether to reposition the projector to increase the size of the image, an attendee wandered in and emphatically said, "Yes! I can't stand another day of squinting."

One of the best presentations I've ever heard was a kind that is rare these days: a speaker who simply spoke. No slides, no "as you can see on this chart . . .," no picture-perfect pizzazz. She talked. We listened. She was lively, dynamic and articulate. The presentation was informa-

*Continued on page 22*

Karten, president of Karten Associates in Randolph, Mass., is a consultant, trainer and lecturer in the management of end-user computing. She is editor of the monthly publication "Managing End-User Computing," published by Auerbach Publishers, Inc.

# No cause for gloom and doom in MIS education

**READER'S PLATFORM**

The two-part series, "Crisis in Education" [CW, June 15 and 22], paints too gloomy a picture of enrollments in business school-based MIS programs.

It is true that the number of students enrolled as undergraduate or graduate MIS majors has leveled off or may have declined at some schools. However, this plateau has occurred after a 10- to 15-year period of very high growth. Today, as stated in the articles, more than 70% of business schools have established an area of concentration in MIS. Other programs are under development, with a substantial number preparing to begin operation in the coming school year.

Management information systems is a challenging area that requires a blend of formal academic courses. MIS majors must usually complete about one-third of their course work in information systems and the remainder in general business topics. The need for this mix of skills and broad background is well established. Certainly, most information processing managers realize technical expertise is not enough and that managerial knowledge and communication skills are important ingredients for success.

In our experience, the demand by industry for MIS majors at both the undergraduate and MBA levels has never been stronger. Salaries paid to MIS graduates are comparable to, or exceed, those of graduates in other business functions, except, perhaps, for finance graduates from some institutions. Some firms do prefer to hire MIS MBAs with work experience, but this preference holds true for graduates from all academic areas. Many companies are paying tuition fees to help their employees major in MIS.

The total demand for MIS courses by both MIS majors and nonmajors is increasing. All accredited business schools are required to offer MIS courses for non-MIS majors. Such courses familiarize students with computer and communications technology and introduce students to management issues relating to

*Continued on page 22*

This commentary was written by David Naumann, University of Minnesota; Jay Nunamaker, University of Arizona; James Senn, Georgia State University; Ted Stohr, New York University; and James Wetherbe, University of Minnesota.

# Talking

CONTINUED FROM PAGE 21

tive and interesting. No one seemed bored or confused by the absence of mystifying charts and rainbow-colored gibberish.

But in this age of instant graphics, speakers hardly ever just speak anymore. Visuals to accompany every 34 words have become de rigueur. You look at a chart with circles and arrows and listen to the paragraph describing each one.

If you were to see the text of a prepared speech, chances are you would see a reference to a slide for every paragraph. More and more, the intent of the presentation seems to be to view the slides; the talk itself is simply an embellishment.

Do visuals add anything to a business presentation? Sure they do. If they are designed and presented properly, they can help the listener understand, consolidate and remember what is presented. But that "if" is a big one.

### Making the point

One step in the right direction would be to scrap word and graphic slides and use pictorial or whimsical slides, which make the point without needing to be read. I've been sold on this approach ever since I prepared a presentation for a company that had assigned a graphic designer to develop the slides that were to accompany my talk. This guy was a creative genius. I described my objectives for each chunk of the presentation, and as fast I talked, he drew. He came up with cartoons, drawings and clever ways of conveying my message that were much more memorable than tiny text, bulleted items, boring numbers, cryptic charts or multicolored glare.

It is easy to fall victim to the "I'll run off some slides on my way out the door" syndrome. We need to resist the laziness ease of use can cause and put more thought into overall effect. We need to get the wordiness and muddled graphics out of our visuals. We need to let our own words do more of the talking.

For business presentations, visuals should enhance the talk, not the other way around. On the other hand, for a trip to the Galapagos . . .

# Gloom and doom

CONTINUED FROM PAGE 21

the use of information technology in organizations. Students from other functional areas (marketing, finance and accounting, for example) are enrolling in MIS electives such as systems analysis and design, telecommunications, end-user computing and artificial intelligence at an increasing rate.

This demand translates into a need for additional faculty. Conservative estimates say the demand for MIS Ph.D.s exceeds supply by a ratio of at least six to one.

MIS as an area of research is too young to have established an overall theoretical model or a set of research paradigms such as those characterizing older fields. This fact sometimes makes it hard for tenure committees to evaluate MIS research.

However, the situation is improving because of the obvious importance of information technology in organizations and the many opportunities for interesting and important research projects. The high quality of the new Ph.D.s entering the field also contributes to the improving image of MIS.

The articles correctly state that information systems programs and facilities are under continual revision and enhancement. Huge sums of money have been invested by all major universities to build the infrastructure of equipment, laboratories and wide- and local-area networks that will be at the heart of the educational delivery process in tomorrow's university. Such investments are proving to be both sound and effective.

THE situation is improving because of the obvious importance of information technology in organizations and the many opportunities for interesting and important research projects. The high quality of the new Ph.D.s entering the field also contributes to the improving image of MIS.

Many MIS programs also have boards of advisers from industry that meet regularly to help faculty update their curricula. Just as information systems departments in industry struggle to keep up with the changes in technology, the challenges of end-user computing and the shifting of user constituencies, so, too, do MIS faculties struggle to keep their curricula up-to-date and relevant.

For example, the chief information officer concept implies that MIS programs need to broaden the domain of study to include multiple information technologies — end-user computing and telecommunications — as well as traditional data processing.

In summary, there is no need for gloom about the future of MIS programs. MIS is still in its infancy and has some shortcomings. But the achievements to date have been impressive, and we are in a good position to make a valuable contribution to industry in the foreseeable future.


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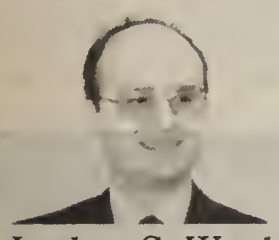


*Jordan S. Wouk*

# Cobol 85 revisited

I've changed my mind. In the May 18 issue of *Computerworld*, I was correctly quoted as being unenthusiastic about the proposed addition of intrinsic functions to the 1985 Cobol standard. Since then, I have studied the addendum in greater detail and have discussed it with others. I now feel that the proposed addition contains some excellent features, a few of which I list below. I urge those interested to get copies of the document, read it thoroughly and let the ANSI X3 Committee know what they think. Comments must be in by August 10.

To me, the most significant productivity enhancement is the ability to do certain functions against one or more entire tables without a loop. The feature can be used in the following functions:

- Determine the greatest or least value.
- Add up all the values.
- Point to the greatest or least value.

Several functions make the processing of input from terminals easier to handle. They include the following:

- Set all letters to uppercase or lowercase.
- Obtain the numeric value of an input string that may contain a combination of digits, spaces,

*Continued on page 26*

# Unix OA import invades U.S.

*Europe-developed, multifunction package gains 35% share of market*

BY MITCH BETTS
CW STAFF

SAN ANTONIO — A previously little-known office automation package for Unix systems has developed a loyal following among MIS managers on its way to capturing a 35% share of the U.S. market for Unix-based office systems, according to users and market analysts.

"The software developers are located in England and therefore [the package] is not too well known [in the U.S.] But it's catching on like wildfire in city offices here," said Robert Kay, director of information resources for the City of San Antonio, referring to Uniplex-II Plus.

The product, a multiuser office automation package for Unix systems that debuted in February 1986, is offered in the U.S. by Dallas-based Uniplex Integration Systems, Inc., a unit of British firm Redwood International, Ltd. According to Dataquest, Inc. researchers, Uniplex leads the U.S. market in installed Unix OA software licenses with a 35% share, in close competition with R Systems, Inc. in Dallas and Quadratron Systems, Inc. in Sherman Oaks, Calif.

### Taking the city

The city government of San Antonio plans to make Uniplex-II Plus the standard OA package for all 27 city agencies, Kay said. Because of limited funding, the package is being implemented on an agency-by-agency basis, beginning with the public works and police departments, he said.

"The departments that are using it have been quite impressed, and the other departments are asking, 'When can we get on?' " Kay added. So far, the software runs on AT&T 3B2 and Plexus Computers, Inc. P/75 systems.

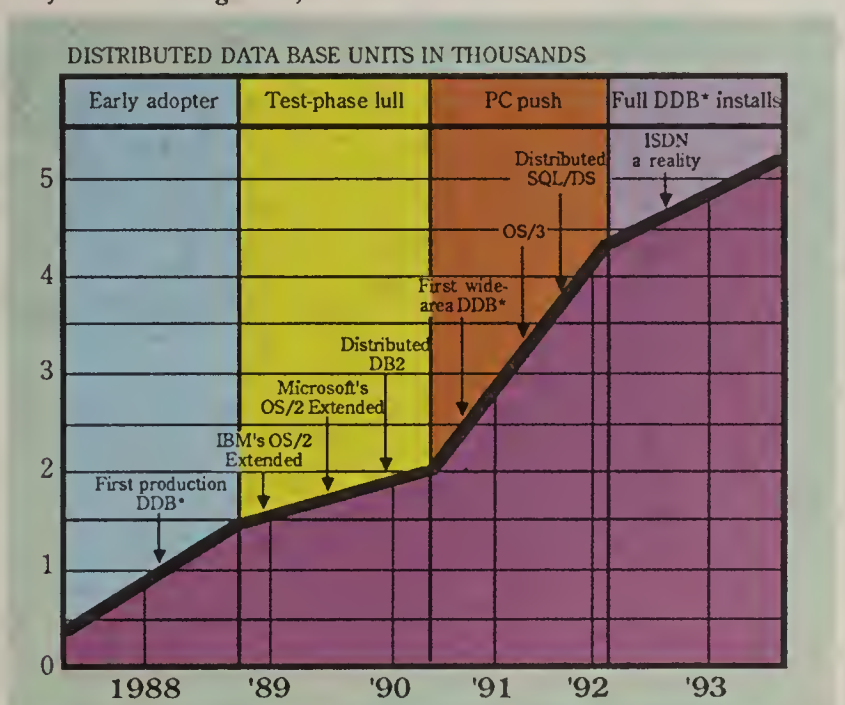
The product features word processing, spreadsheet, financial modeling, relational data base, electronic mail, a screen generator and graphics in an integrated package that employs productwide data sharing and

*Continued on page 25*

# Study: Distributed DBMSs to grow

**Distributed data base**

*Projected market growth, 1988 to 1993*




INFORMATION PROVIDED BY FORRESTER RESEARCH, INC.
CW CHART

CAMBRIDGE, Mass. — Fortune 1,000 firms are finding disparate computer systems invading their offices — despite MIS attempts to prevent it — and will turn to distributed data base management systems to tie them together, according to a Forrester Research, Inc. report released recently.

"Data on these systems must be linked into a coherent corporate resource. Forrester believes this technology will become the applications 'glue' for distributed systems," the report states.

Company mergers, the downsizing of computer systems and increased data base needs will push the growth of distributed data base systems, Forrester says, although the real growth will not begin until 1988 or later, despite vendors' claims.

Among the early vendors, Or-

*Continued on page 25*

# Factory software revamped

BY ROSEMARY HAMILTON
CW STAFF

CHICAGO — A number of manufacturing software vendors rolled out revamped packages for Digital Equipment Corp. and IBM hardware at the Advanced Manufacturing Systems Exposition and Conference held here late last month.

System Software Associates, Inc. (SSA) in Chicago announced a file-conversion tool to lure users away from IBM's Manufacturing, Accounting and Production Information Control System (MAPICS) to SSA's Business Planning and Control System (BPCS). BPCS competes with IBM's MAPICS in the IBM System/36 and 38 arena.

The utility, scheduled for availability later this month, will be offered to new BPCS users at no charge, SSA said.

The vendor said its manufacturing system assists users in converting both static and dynamic data from MAPICS I files to BPCS. It reportedly allows users to create cross-reference files that match equivalent characters with differing key lengths between systems. Audit trails are generated for verification before making the conversion, the vendor said. After the conversion, the audit trail describes

*Continued on page 26*

## Inside


- IBM joint marketing program offers independents' applications. Page 24.
- Micro Data Base Systems ports Guru to VAX. Page 27.

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# IBM sales reps to offer other vendors' software

BY CHARLES BABCOCK
CW STAFF

RYE BROOK, N.Y. — IBM recently launched a joint marketing program that will allow its salesmen to offer selected software applications from independent suppliers as part of a sale of its own hardware and software.

Called the Cooperative Software Program, the 13 initial selections include applications in accounting, manufacturing and construction.

IBM spokesmen said the prices listed were the same as those charged by the software suppliers.

Big-name software suppliers were notably absent from the list. There were no names equal to Hogan Systems, Inc., with which IBM signed a 20-year product licensing agreement for banking applications last year.

Sam D'Angelo, general manager of special products at Cadam, Inc., said his firm anticipates increased sales of its CADG Plus FM with the implicit IBM endorsement of its product. He said entering into the cooperative marketing agreement allows IBM to supply its customers quickly with products that have been proven in the marketplace. IBM collects a fee every time one of its salesmen makes a sale, he noted.

### Use for Infowindow

Three laser videodisk instructional courses were included in the group of applications selected by IBM, indicating that third-party suppliers have been able to come up with useful implementations of IBM's Infowindow system, a personal computer-based videodisk system using a touch-sensitive screen.

Intelligent Images, Inc. in San Diego, for example, is supplying a library of videodisk courses on hospital emergency and critical care, called the Dxter Clinical Simulator System, at $1,695 per module.

Cadam is supplying CADG Plus FM, a host-based multiuser product for strategic planning and facilities management. It is priced at $100,000 for the base module. The firm is also providing Basicad, an $11,500 tool to allow user-defined macroinstructions to be written, executed and debugged from a Cadam terminal.

The state of Kentucky is supplying Project Vision, a $1,995 interactive presentation of mathematical skills for first- and second-grade students.

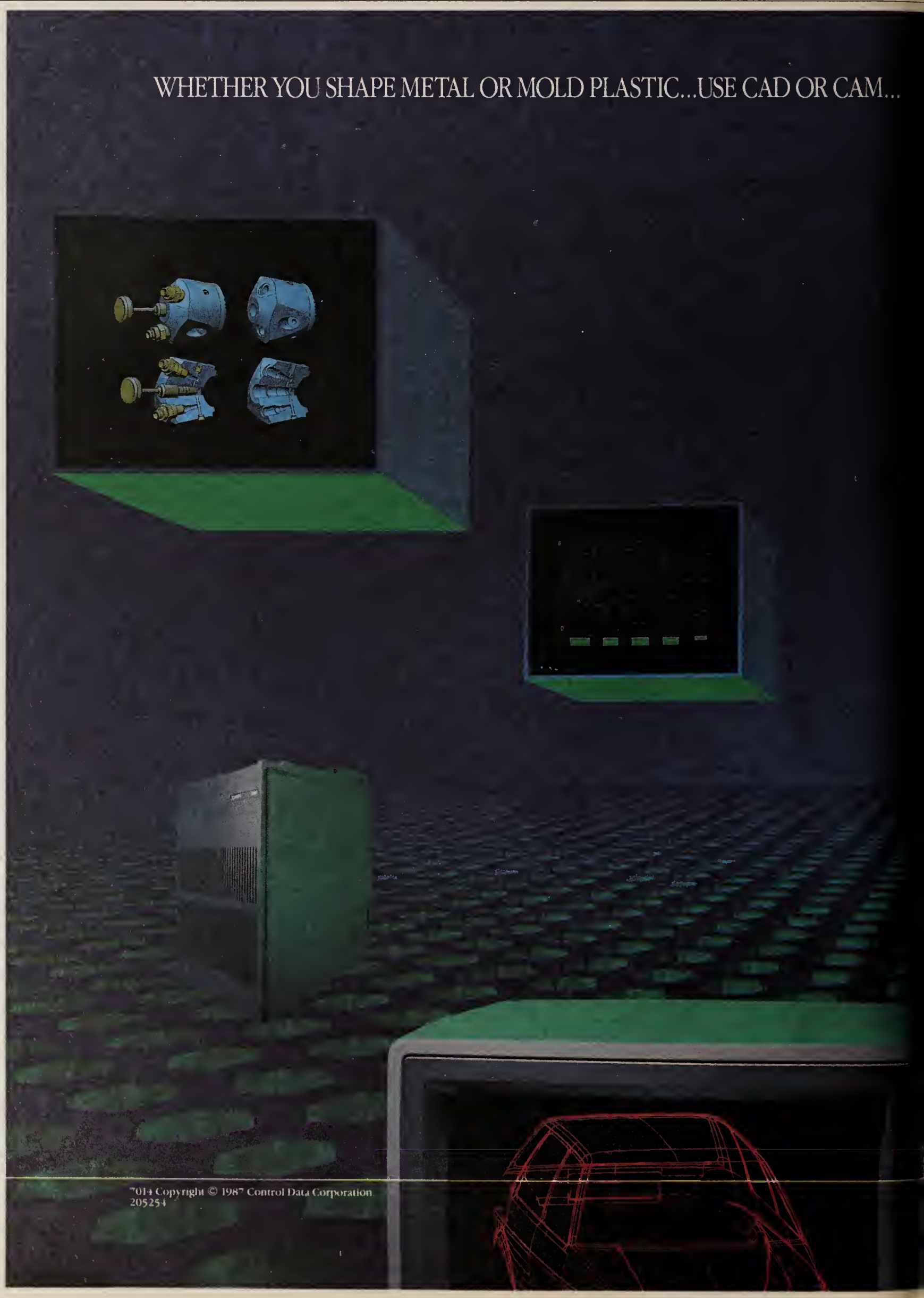
R. C. Houlihan Associates, Inc. in Bayville, N.J., is supplying CMAS/Plus, a $2,250 package for construction-management accounting that runs on a System/36.

Linton Shafer Computer Services, Inc. in Frederick, Md., is supplying the $3,850 Financial Reporting/General Ledger System for IBM's System/36 PC and the System/36 5360 at a price of $5,200. Linton Shafer is also providing the Time Management System, a $4,600 System/36 PC package for accounting firms to track staff time and expenses by client. The same package is available on the System/36 5360 and 5362 for $6,300.

Prism, a plantwide manufacturing planning and control system for the System/38 from Marcam Corp. in Needham, Mass., includes three modules ranging in price from $22,000 to $28,000.

ON/2 is a set of on-line transaction processing modules for the IBM System/88 that supports many electronic funds-transfer and message-switching applications. It is supplied by Shared Financial Systems in Dallas and costs $75,000.

Action 2000 is a line of transaction-processing software for financial services and retail industries supplied by the Irving, Texas-based Mtech Electric Banking Division of Momentum Co. The mainframe-based package is priced at $275,000 for a package driving automated teller machines and at $200,000 for a switching package.



# DBMS

FROM PAGE 23

acle Corp., Relational Technology, Inc., Sybase, Inc. and Tandem Computers, Inc., "No one is shipping products," the report claims.

In addition, the Forrester report predicts that what it calls the early four firms will not be able to meet their aggressive delivery schedules.

"The greatest growth for distributed data bases will be the 1990 to 1992 period, sustained by the announcement of IBM's distributed DB2 product late in 1990," the report claims.

At the same time, a third-generation IBM Personal Computer operating system for machines based on Intel Corp.'s 80386 microprocessor will improve the viability of distributed data bases on PCs and local-area networks, the report says.

### Slow but steady

The Forrester report contends that the remainder of the 1990s will see a steady but slow increase in the use of distributed data bases.

This increase will be fueled by companies that are attempting to build corporatewide information architectures using distributed data bases.

The increase in the use of distributed data bases will, in addition, be driven by late adopters that are resorting to distributed data bases to handle large data bases and multivendor environments, the Forrester report concludes.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CONTROL DATA


# Unix OA

FROM PAGE 23

windows. In addition, the package uses a generic command system, soft keys and pop-up menus to make it easy for office workers to use.

The relational data base manager uses the C-ISAM data structure from Informix Software, Inc. in Menlo Park, Calif., and is fully compatible with data bases developed under Informix-SQL, a relational data base management system (DBMS) for application building, and Informix-4GL, a fourth-generation programming language.

The price of Uniplex-II Plus is based on processor size; the price for the AT&T 3B1 version is $1,500.

### Data integration cited

Kay cited the product's data integration and user interface as key reasons for his choosing Uniplex-II Plus as San Antonio's standard office automation package.

Likewise, Andrew Bennett, director of MIS for the Regional Transit Authority of New Orleans, said he has adopted the Uniplex package for use on AT&T 3B1 and 3B2 and Plexus P/75 systems that will soon support 98 terminals.

Bennett said earlier versions of the product had several software bugs and integration problems, but the Uniplex-II Plus version introduced at the Uniforum 1986 trade show had eliminated the problems.

But Bennett said that the user manuals still need improvement. "The manuals are the weakest part of the package. I understand they've been rewritten, but I haven't seen the new version," he said.

### Data base access

One attractive feature of the DBMS in Uniplex-II Plus, Bennett said, is its compatibility with Informix-SQL and Informix-4GL. In essence, the interface gives users direct access to Informix data bases through their familiar Uniplex screens and menus, he said.

"I like the ability to modify the menus and change them to meet user needs for access to particular types of data," Bennett added.

The OA software also runs under Unix-like operating systems for the IBM 370 IX, IBM Personal Computer AT and RT PC, as well as several other hardware lines.

Uniplex recently announced modules that allow users to exchange documents with systems that employ IBM's Document Content Architecture and the U.S. Navy's Document Interchange Format and is expected to announce additional document-exchange programs this year.

# Cobol 85

CONTINUED FROM PAGE 23

commas, decimal points, dollar signs and plus or minus signs.
• Reverse the contents of a field to help count the number of trailing blanks and determine the trailing delimiter.
• The Modulo function, sometimes used as a remainder function, makes it simple to test for odd or even.
• Date and time of compilation and current date and time are important for control and audit.
• Four date-manipulation functions support both year/month/day and Julian calendar formats. The functions can help with date calculations, particularly with those related to the year 2000.

Other functions include annuity, factorial, pseudorandom numbers and trigonometric and logarithmic functions. And there are more.

Adding these functions to Cobol will result in increased productivity for at least two reasons. First, while some of the facilities are available in existing environments, making them part of standard Cobol will enhance the portability of programs and reduce the learning curve when programmers go to different environments.

Second, the addendum defines a group of commonly used general-purpose routines. By having the routines widely available, debugged and well documented, a programmer can spend a greater portion of effort on the application-specific logic.

My strongest objection to the proposed additions is that they are limited in scope. Many completely compatible enhancements and features have been developed for Cobol but are not addressed in the addendum. A brief sampling includes the following:
• Comments on the same line as source code.
• A concatenation operator for literals, instead of the awkward continuation.
• Set 88-level condition name TO FALSE.
• Dollar signs and commas in numeric literals to enhance readability.
• Floating-point data.

Other facilities have been developed that are compatible except for the addition of one or more reserved words. Some are listed here:
• EXIT PARAGRAPH and EXIT SECTION, which are part of a structured language.
• A very powerful validation facility.
• Boolean operators.
• Defined intermediate results, which are desperately needed to ensure correct and consistent results in arithmetic expressions.

Those who want to find out what has been developed for Cobol can contact the chairman of the Conference of Data Systems Languages' Cobol Committee, Don Nelson, at Tandem Computers, Inc., MS 100-05, 10555 Ridgeview Court, Cupertino, Calif. 95014.

Wouk is vice-president for quality assurance at the Bank of New York and observer of the X3J4 Cobol Committee of the American National Standards Institute.

# Factory

CONTINUED FROM PAGE 23

the fields that were converted and their equivalents in BPCS.

SSA also added two modules to BPCS that it said will be available this month. BPCS/BIR is a report generator that the vendor said can be licensed for $8,000 for the System/38 and $3,500 for the System/36. BPCS Payroll will be offered as a stand-alone financial package or as a component of the manufacturing system, SSA said. It costs $12,000 for a System/38 license or $6,000 for a System/36 license.

Ask Computer Systems, Inc. in Los Altos, Calif., added a lot-tracking and reporting module to its Manman Information System for DEC VAX systems. Manman/Tracker is said to provide users with information on where materials are located through the various phases of the manufacturing process and to alert users when materials expire. In addition, it provides three levels of security: open, restricted and no access. Prices range from $16,875 to $37,500, depending on the DEC hardware, the vendor said, and it is currently available.

MCBA in Glendale, Calif., said it will begin shipping the job-costing module of its VAX Cobol series for DEC hardware this month. The vendor currently offers three modules — Shop Floor Control, Bill of Materials and Inventory Management — as its manufacturing resource planning system, which it said will eventually consist of 18 modules. The software was designed to track and analyze manufacturing costs and compare actual costs with estimated costs. Licenses start at $4,000.


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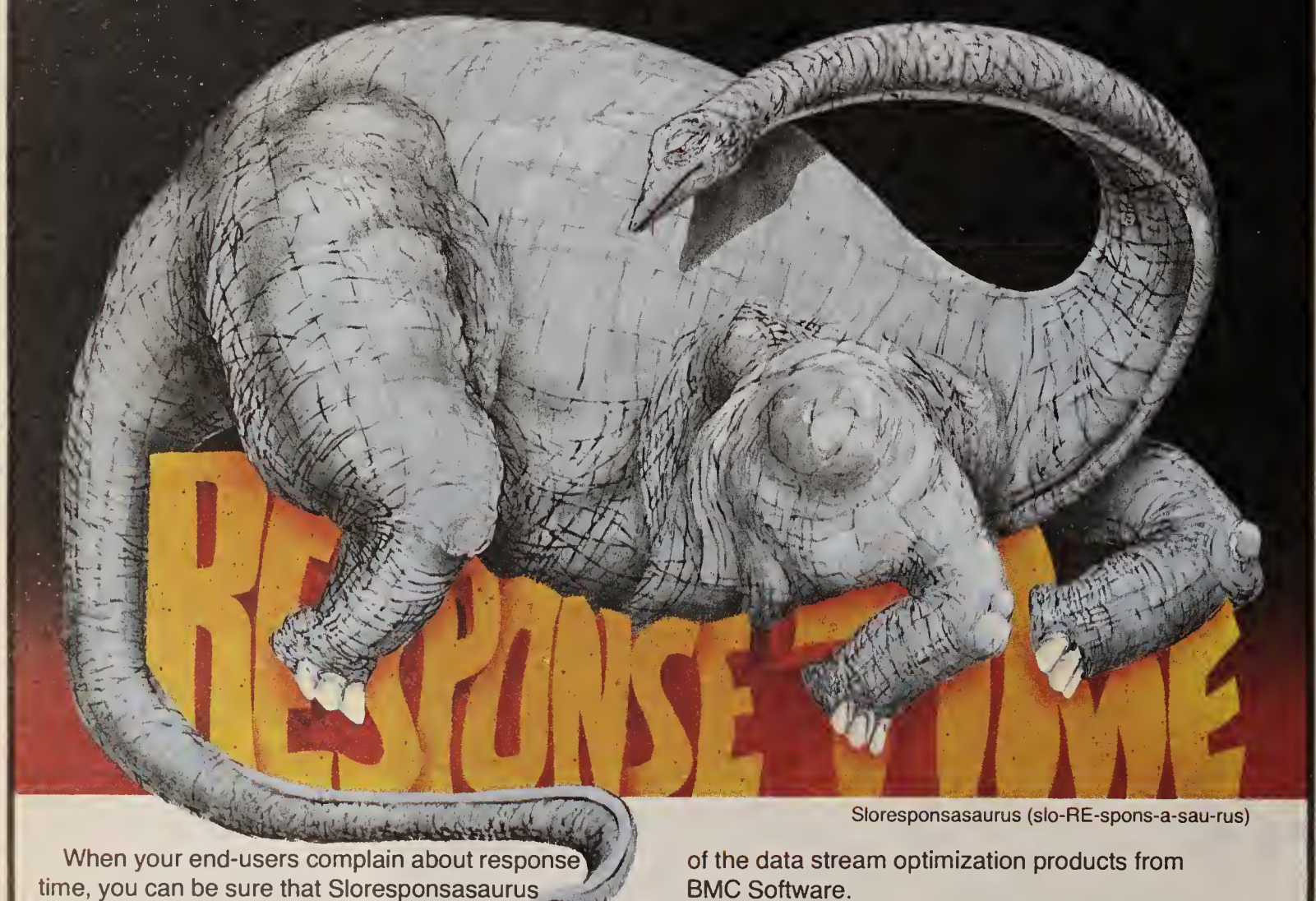


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# NEW PRODUCTS

## Systems software

A software system for Digital Equipment Corp. VAX/VMS environments said to provide customized multilevel authorization, monitoring and resource accounting and chargeback functions has been announced by **Ergodic Systems, Inc.**

According to the vendor, **Overseer** provides the ability to organize and manage a VMS system by customers, project and subproject groups, tasks and other site-defined entities. Features include live data capture and reporting of royalty program execution, disk space and batch and print jobs and interactive sessions. Network communication servers provide automatic network job accounting and a checkpoint-restart capability prevents the loss of any accounting data in the event of a system crash.

Overseer costs from $2,500 to $10,500.

Ergodic Systems, Suite 105, 3900 Birch, Newport Beach, Calif. 92660.

## Applications packages

A scheduling system for the IBM System/38 said to feature the ability to operate multiple programs while working with multiple dependencies has been unveiled by **Macro Business Services**.

**Scheduler/38** also features multiple calendars, schedule logging with an audit trail, automatic schedule recalculation and user-defined accounting chargeback.

Scheduler/38 is priced at $2,500.

Macro Business Services, Suite 380, 2107 N. First St., San Jose, Calif. 95131.

## Languages

**Version 2** of **Waterloo Modula-2**, a full-function compiler for the Modula-2 programming language, has been announced by **Watcom Products, Inc.**

Modula-2 is said to provide a load-and-go capability. Programs can be compiled directly from the CMS text editor Xedit into memory for immediate execution, eliminating the need for separate edit, compile, link and execute steps. Once a program has been debugged, Waterloo Modula-2 can be run in production mode to generate optimized code in standard CMS object-file format.

Version 2 includes additional programming library modules said to facilitate I/O tasks and integration into the VM/SP CMS environment.

The annual license fee for Modula-2 is $1,800.

Watcom Products, 415 Phillip St., Waterloo, Ontario, Canada N2L 3X2.

## Utilities

**DB/Access, Inc.** has developed **Access/Star**, a data-sharing software product.

Access/Star is said to extract data from dissimilar computers and data bases, route the extracted data over existing networks and deliver the data to the user's application.

Access/Star is installed in VM/CMS and Digital Equipment Corp. VAX/VMS departmental systems. It is available for files and data bases on MVS, CM/CMS, VAX/VMS, Tandem Computers, Inc. and Hewlett-Packard Co. HP 3000 systems. Extractors are available for IBM's DB2 and SQL/DS; Information Builders, Inc.'s Focus; On-line Software International, Inc.'s Ramis; DEC's Rdb; Tandem's Encompass; and seqential files.

A typical configuration is priced from $5,100 to $25,500.

DB/Access, Suite 200, 20111 Stevens Creek Blvd., Cupertino, Calif. 95014.

**BMC Software, Inc.** has announced **Loadplus for DOS/VSE**, a utility said to reload DL/1 data bases two to six times faster than the HD Reorganization utility.

Loadplus is said to create data bases identical in structure to those of the DL/1 utility. It supports current versions of DL/1 and DOS/VSE. According to the vendor, Loadplus space-search algorithms provide user control over the placement of segments in the data base, resulting in a reduction in the number of I/Os required to retrieve data and better utilization of the available direct-access storage device space. Ten reports are generated.

Loadplus for DOS/VSE is priced at $7,500 or $420 per month.

BMC, P.O. Box 2002, Sugar Land, Texas 77487.

**Version 2.02** of **V/Copy**, a utility for copying CMS files that replaces the CMS Copyfile command, has been announced by **VM Systems Group, Inc.**

V/Copy is said to replace command sequences with a single, intuitive command, provide immediate commands to monitor or modify long-running commands, run as a self-loading nucleus extension and handle all Copyfile, file-processing and selection options.

V/Copy is available for all releases of VM/SP amd HPO. Prices start at $3,625 for a three-year license.

VM Systems Group, 901 S. Highland St., Arlington, Va. 22204.

## Development tools

**Micro Data Base Systems, Inc.** has ported its **Guru** expert system environment featuring such information management tools as relational data base, spreadsheet and forms management to the Digital Equipment Corp. VAX series of computers.

The VMS and Ultrix versions of Guru support full-record and file-locking capabilities. Guru is compatible with Decnet, allowing remote consultations and data base access. According to the vendor, applications can be transported between minis and micros.

Guru Tutor, which contains on-line instructions and the capability for developing a 30-rule expert system, is provided as part of Guru.

The DEC VAX versions of Guru are priced from $17,000 to $60,000.

Micro Data Base Systems, P.O. Box 248, Lafayette, Ind. 47902.


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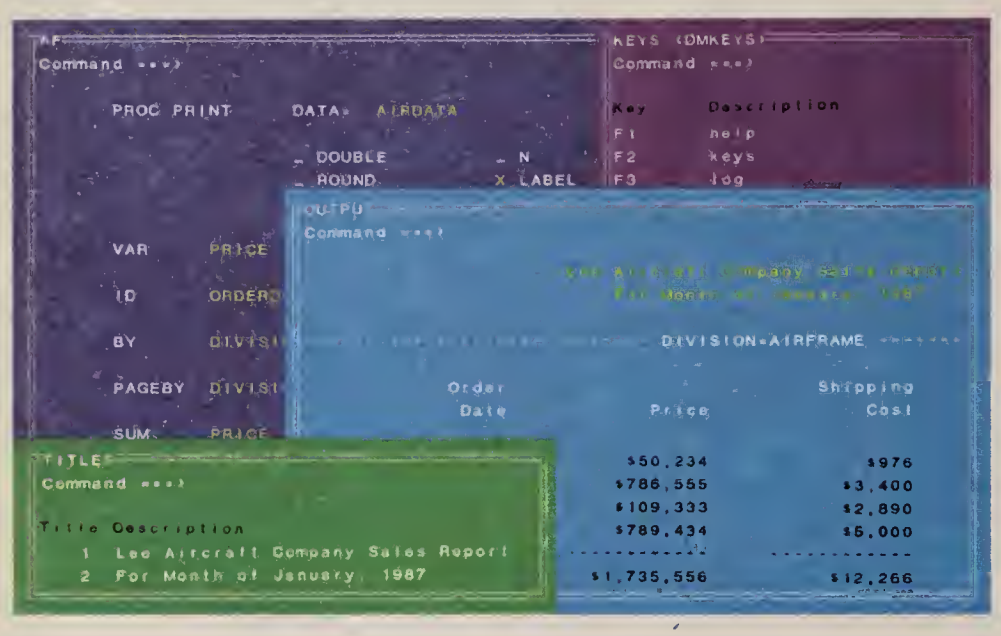


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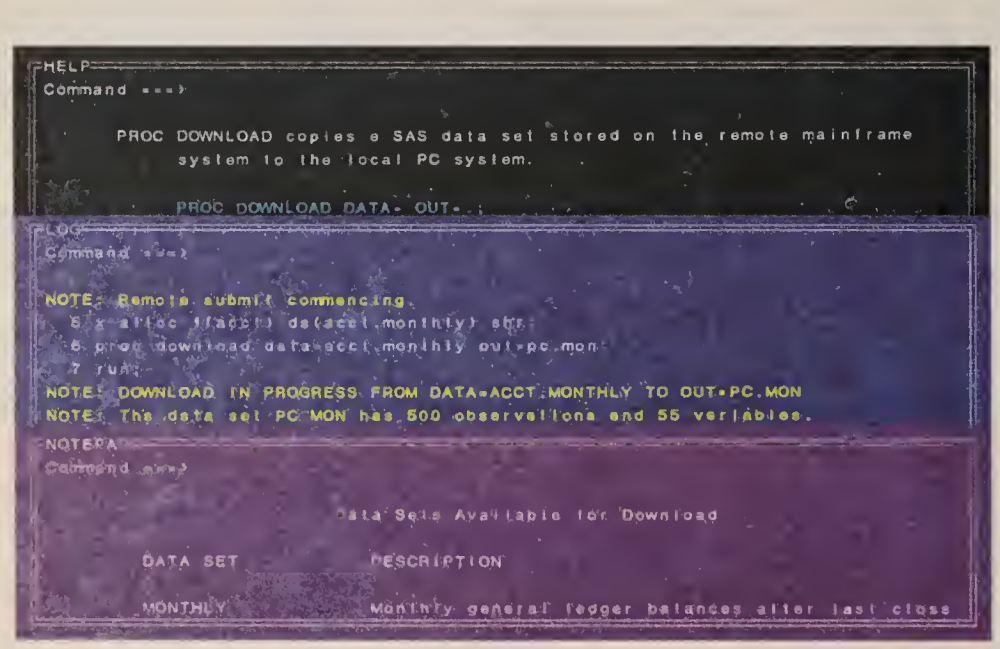


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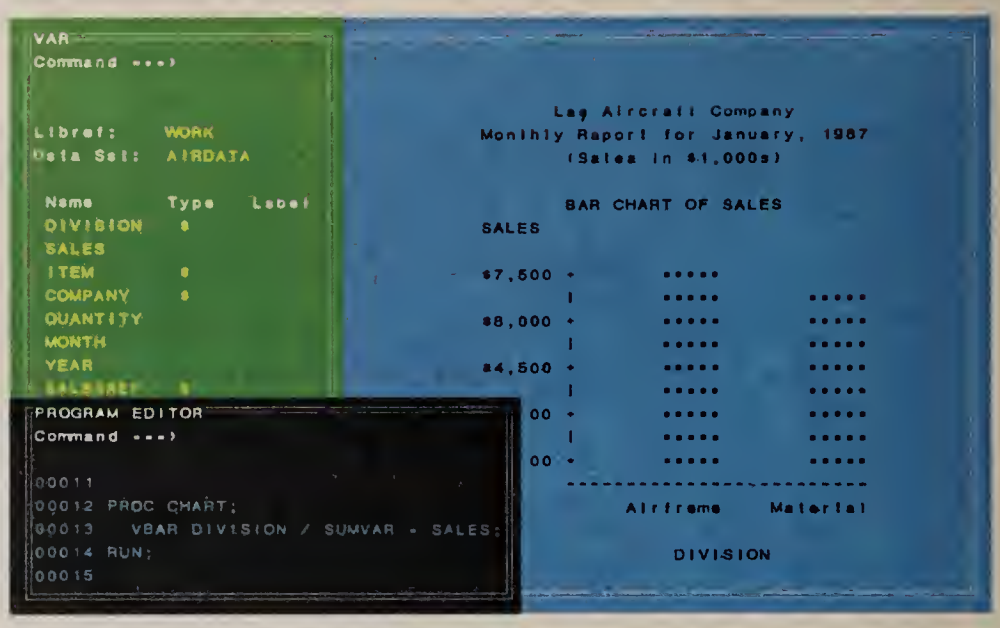


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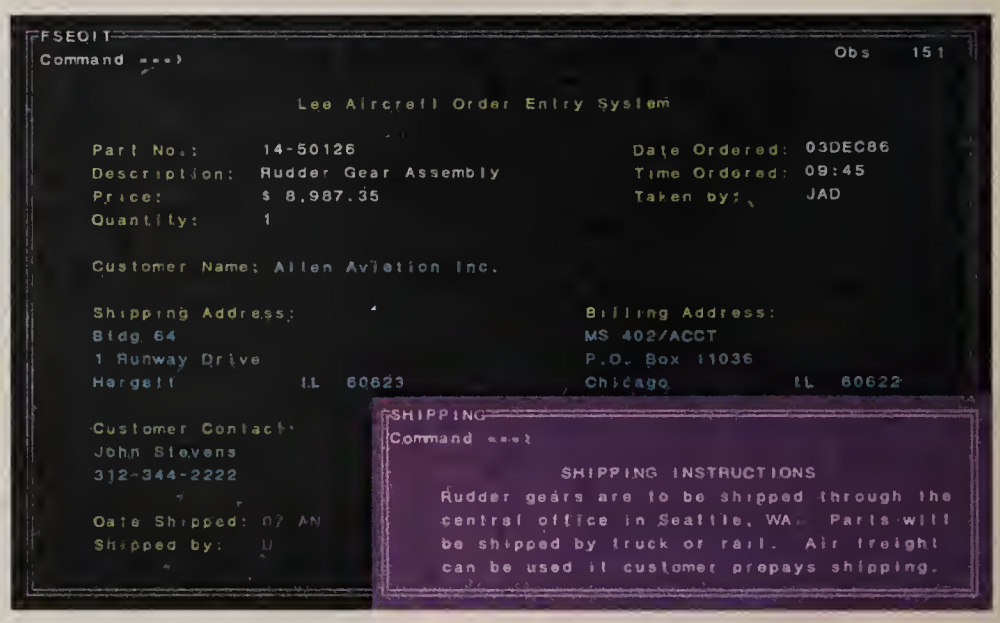


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SMALL TALK

*William Zachmann*

# A pocketful of miracles

One of the best kinds of innovation is an idea that is so good that, afterwards, it hardly seems possible everybody wasn't doing it already. Plus Development Corp.'s hard-disk-on-a-card products are an excellent example.

The Pocket Modem from Incline Village, Nev.-based Migent Software, Inc. is another. Weighing in at only 9 ounces, the Pocket Modem offers 300 to 1,200 bit/sec. Hayes Microcomputer Products, Inc.-compatible modem capabilities in a 1.3- by 2½- by 5-in. unit that looks like it ought to be on display at New York's Museum of Modern Art.

With surface-mount internal engineering to match its exterior industrial design, the Pocket Modem is not only a terrific product for use with portable systems, but also a first-class alternative for stationary personal computers. It plugs directly into a 25-pin RS-232 communications port or can be connected to a nine-pin IBM Personal Computer AT-type port

*Continued on page 33*

# Microsoft marketeer speaks out

*Brings to fore push for applications turf, common graphics interface*

As director of applications marketing for Microsoft Corp., Jeff Raikes is responsible for that company's highly aggressive push into the applications market.

Microsoft, best known for its languages and operating systems, is preparing to go after areas currently staked out by its rivals, including dominant data base vendor Ashton-Tate and spreadsheet kingpin Lotus Development Corp.

*Computerworld* Senior Editor Douglas Barney recently spoke with Raikes about the still-unannounced IBM Personal Computer and compatible version of its Excel integrated spreadsheet, along with its strategies for the applications marketplace and the hoped-for emergence of a common graphics user interface for PC software.

**What advantages will PC Excel have over a graphics-based version of Lotus's 1-2-3?**

That is pretty hard to say, given that there hasn't been any announced information on what 1-2-3/G would be.

One of the advantages Microsoft will have is that since that we believe in the move toward a graphics user interface, we are supporting it right away.

Lotus is actually putting people off and trying to get them to go to another character-user interface version, the old user interface, before they go to the new interface.

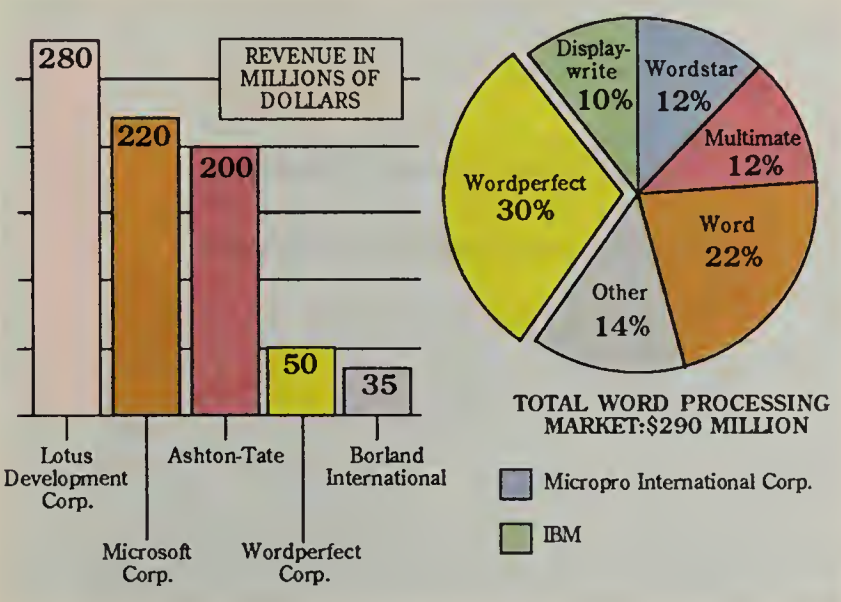
We will be on the new standard user interface long before Lotus will with our Windows version, and then move to the Presentation Manager. These products will have the same look and will be [IBM] Systems Applica-

*Continued on page 32*

## Data View

Wordperfect's rise to the top

*Wordperfect pulled into fourth place among software companies in 1986 and gained the top spot among word processing vendors*

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CW CHART

# Slow that PC down!

BY ALAN J. RYAN
CW STAFF

DEDHAM, Mass. — While most new microcomputer hardware products hype vast increases in processing speed, a utility from Soft-Sense appears to be bucking that trend by putting the brakes on the fast processors.

The product, called Pacer, was designed to slow the speed of fast microcomputers like the IBM Personal Computer AT and compatibles operating under Microsoft Corp.'s MS-DOS. The utility reportedly can make the Intel Corp. 8088, 80286 and 80386 processors operate as

*Continued on page 33*

# Business decisions disclosed

BY ALAN J. RYAN
CW STAFF

PHILADELPHIA — The business decisions of America's top corporate leaders are something few of us are privy to, but a new software package from Reality Technologies is aimed at changing this situation.

The software, called Business Week's Business Advantage, is said to allow users to make business decisions based on actual case studies that have been reported in *Business Week* magazine.

Through the simulation software, the user reportedly faces the same decision-making situations as industry giants, according to company President Mark Goldstein.

The software program provides the user with information about the company's operating environment, which includes facts on competitive products, market share and strategic positioning and economic and industry trends.

*Continued on page 30*

## Inside


- Micro Focus ships Cobol development kit for PC-DOS, OS/2. Page 30.
- 20/20 Data Systems sees its way clear to adding slide package for Mac. Page 34.



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# Micro Focus launches Cobol development kit

BY ALAN J. RYAN
CW STAFF

PALO ALTO, Calif. — To help launch its new generation of Cobol technology, Micro Focus, Inc. last week began shipping its Cobol/2 Software Development Kit, targeted at IBM PC-DOS and OS/2 applications.

Included in the kit are a Cobol/2 compiler, a visual debugging tool, an extended-memory program for writing protected-mode applications under PC-DOS and an editor.

With the tool kit, users with applications running on IBM Personal Computers and compatibles now who want to convert them to OS/2 stand a good chance of having the applications completed when IBM rolls out OS/2, Micro Focus said. It is unlikely, however, that entirely new applications would be available to run on OS/2 that quickly.

"It's not impossible, but it would be difficult to get the application coded, tested and out on time," said John Beggs, market development manager at Micro Focus.

Key to the technology is the kit's compiler, which supports nine Cobol dialects, according to Beggs. The compiler reportedly offers maximum flexibility to a developer who wants to bring existing Cobol code from a non-PC-DOS environment.

By using Micro Focus Cobol standards as a vehicle, programmers can migrate Cobol source code from the mainframe to the personal computer and on to Unix- and Microsoft Corp. Xenix-based machines running Micro Focus Cobol, the vendor said.

Cobol/2 compiles ANSI-standard Cobol 74 and Cobol 85, IBM mainframe OS/VS and VS Cobol II, Micro Focus Level II Cobol, Ryan-McFarland Corp. M/Cobol, Data General Corp. Interactive Cobol, IBM PC Cobol Version 1 and IBM's Systems Application Architecture.

The compiler eases the task of migrating Cobol source code through its 32-bit addressing architecture, the vendor claimed. As a result, large mainframe programs that have been unusable on personal computers without extensive reworking can now be transferred to the micro and compiled intact.

Another component of the tool kit is XM, which the vendor said adds the ability to use extended-memory facilities to reach beyond the 640K-byte boundaries of PC-DOS.

The Software Development Kit can be ordered by developers through July 31 for $1,500, Micro Focus said. The compiler with the Animator debugger sells separately for $900.

# Business

FROM PAGE 29

By manipulating the information, Reality Technologies said, the user attempts to strategically manage the company for a period of one year, as simulated by the program.

Business Advantage incorporates a 400-rule expert system, posting results and explanations so the user can see how his strategy affected sales, return on investment and profits.

Goldstein said the lessons in competitive strategies and management can be applied to any business. The program is currently available for use on IBM Personal Computers and compatibles and is scheduled to be available for Apple Computer, Inc.'s Macintosh later this summer.

The software is available through Reality Technologies and will be distributed to retail channels by Broderbund Software.

List price is $49.95, and case studies include Lee Iacocca, chairman of Chrysler Corp., and Rod Canion, chairman of Compaq Computer Corp. A one-year subscription featuring a new study each month costs $299.95.


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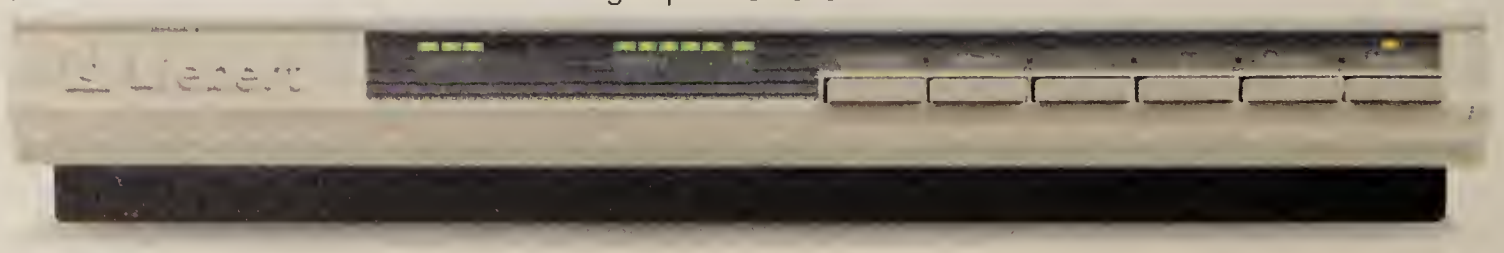

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# Marketeer

CONTINUED FROM PAGE 29

tion Archiecture [SAA] user interface-compliant.

**Should users consider PC Excel as part of their purchasing plans?**
Just as people are considering IBM PS/2s and that kind of high-performance hardware, they should also be looking at the high-performance spreadsheet, Excel, that will take advantage of that hardware to provide a new level of performance in spreadsheets.

**What do you think about 1-2-3/M, the mainframe version of 1-2-3, which may be an effective way to consolidate data?**
One of the overlooked weaknesses in the 1-2-3/M strategy is that it is not an SAA user interface-compliant product. It is a little weird to have Big Blue out there selling the user interface anarchy as opposed to SAA. I think what is likely to happen is that the companies that are already strong in mini and mainframe spreadsheets will move quickly toward SAA user-interface compliance. Then what advantage does Lotus 1-2-3/M really have?

Customers are particularly interested in things like consolidation, and there may be be superior ways to consolidate information. In some sense, you can say PC Excel is likely to work just as well, maybe even better, in terms of being consolidated by 1-2-3/M. We supported the .WKS format, both read and write, in Microsoft Excel for the [Apple Computer, Inc.] Mac, where [Lotus's] Jazz didn't even support that.

**What do you think IBM's goal is in the applications market? Do you expect to compete with them?**
Today, they have not been a force in the applications side of the business. They have really focused in on the systems side of the business, and that makes sense. I expect that they might try to change that at some point in the future, but it is pretty hard to compete with this young, aggressive, independent software community.

**Are there any advantages to also being a languages and systems software company?**
Absolutely. Our strength in those areas does help the applications side of the business.

In particular, what helps is the close working relationship we have with hardware manufacturers — the fact that we are working with them and sometimes even influencing the directions that they are going in. That kind of vision helps us a great deal. But a lot of it is not so much knowing it, but putting it together.

**Why haven't we seen Windows applications from Microsoft?**
Software development is a little bit like a production process — not like hard goods, where you can see the smokestacks. We have a major investment in graphics user-interface software, and sometimes it isn't as visible as you might expect.

**Is Microsoft interested in true multiuser applications in the style of minis and mainframes, or is local-area network [LAN] the way to go?**
We feel that the 386 in particular provides a very strong foundation for a server. You will see LAN enviroments where the 386 is a server, a [Digital Equipment Corp.] VAX or Microvax is a server or an [IBM] 9370 is a server. In the long run, some of the advantages of the 386 — in particular its open architecture — will make that the dominant server.

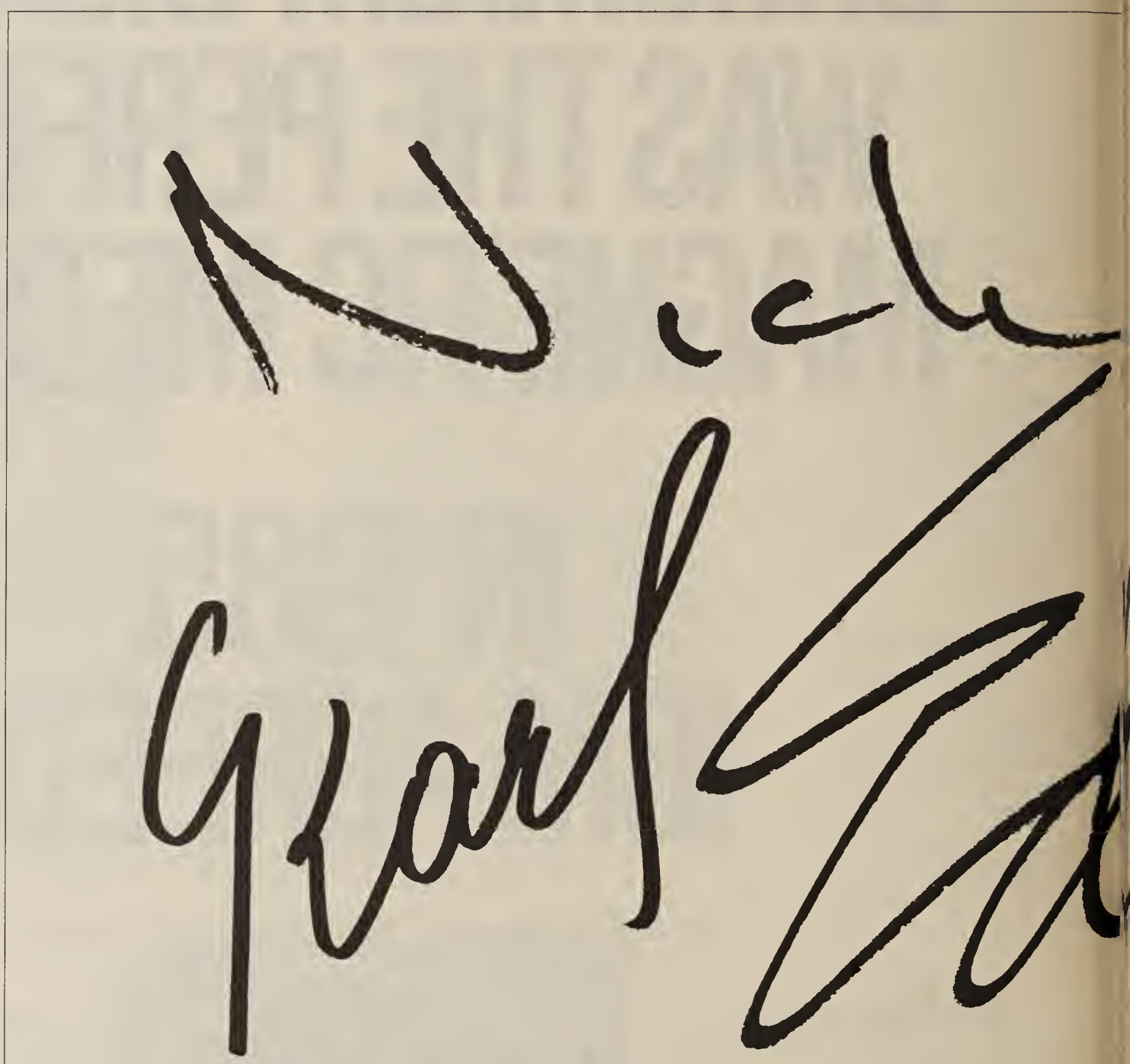
Microsoft's Raikes

You will see these other environments, in particluar the VAX and 9370, but beyond that, I wouldn't paint a bright future for minicomputers as servers. They will continue to have their role as small host computers. That is part of the reason why Microsoft is oriented toward the networked environment as opposed to the host-software approach.

**How are you going to tie all your applications together? Are you planning a common data structure?**
We are looking at supporting common data-exchange protocols, in particular DDE, which needs to be extended to work across networks. The problem with trying to have common data structure underlying all applications is that the data structure required to build a great spreadsheet is different from that required to build a great data base or word processor.

**Will you write for the OS/2 kernel and then the Presentation Manager, as many vendors are planning?**
The ones writing for just the kernel are doing it backwards. The winning approach is to do the Windows applications and then take them to the Presentation Manager.

If you just try to go for OS/2 — for example, just introducing a spreadsheet that has the same interface — you are continuing in the world of user-interface anarchy. What corporate accounts want to move toward is the standard user interface, which is Windows 2.0 and OS/2 Presentation Manager.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# Pocketful

CONTINUED FROM PAGE 29

with a short adapter cable.

The phone line plugs into the other end of the Pocket Modem via a standard RJ11 modular phone jack. A second RJ11 extension jack on the back of the Pocket Modem can be used to attach a telephone. The Pocket Modem can be run for up to 12 hours powered by a 9V transistor radio battery or, alternatively, can plug into a wall socket through an AC/DC power converter.

The $259 list price for the Pocket Modem includes the converter, a 25- to 25-pin extension cable, the 25- to nine-pin adapter, a 7-ft. RJ11 to RJ11 telephone cable and a 9V battery.

The Bitcom communications software bundled with the Pocket Modem gives you everything you need for personal computer data communications. Included are ANSI color and graphics, Digital Equipment Corp. VT100 and VT52 terminal emulation and IBM 3101 emulation capabilities.

Being Hayes compatible, the Pocket Modem also works with widely used communications software for IBM and compatible systems such as Microstuf, Inc.'s Crosstalk and Hayes' Smartcom.

I did encounter minor initial glitches in using the Migent Pocket Modem. The SETUP program that came with it wasn't working properly, and neither it nor its problems were documented. This program was intended to be used in setting switches in the nonvolatile enhanced erasable programmable read-only memory of the Pocket Modem. These are used instead of physical DIP switches.

### Going to work

Initially, I had some problems getting the Pocket Modem to work with Hayes' Smartcom in my office. The problem was a result of the factory default on the Pocket Modem being set for pulse dialing. Although I had told Smartcom, via its configuration screen, that I wanted tone dialing, it wasn't happening.

Once I realized that Smartcom's modem-initialization routine expected a tone-dialing default setting, the path to the solution was clear. I simply needed to change the soft switch in the nonvolatile memory of the Pocket Modem. The question was, How?

The nonfunctional character of Migent's SETUP program didn't help matters. By talking to the Pocket Modem through Migent's Bitcom program, I eventually figured out how to configure the Pocket Modem so that it would work with Hayes' Smartcom.

Despite the glitches, which I suspect might lead a traditional reviewer to chalk up some bad marks for Migent's documentation and technical support, I have no hesitation recommending the Pocket Modem for anyone who wants a good buy in a remarkably portable and usable 300 to 1,200 bit/sec.modem. The basic product is excellent and, once I figured out how to use it, did its job very well.

Companies relatively new to a market don't always get it perfect the first time around. Although Migent still has a bit of sorting out to do, the product looks to be a winner, and I expect that Migent will have no difficulty in correcting its problems.

Migent's Pocket Modem has already bred a number of imitators, just as Plus Development's Hardcard did one year ago. In both cases, imitation is undoubtedly a testament to the excellence of the innovative idea behind the product.

---

Zachmann is vice-president of research at International Data Corp.

# Slow down

CONTINUED FROM PAGE 29

much as 600 times slower than normal, according to the vendor.

The usefulness of this type of utility comes into play when running software written for slower personal computers that will not perform properly on faster machines, the firm said. Some software copy protection schemes, in particular, wreak havoc when run at faster clock speeds.

Other uses, the vendor claimed, include debugging and reverse-engineering graphics screens, windows and menus by running them in slow motion to see their formation pixel by pixel, allowing programmers and reviewers to see how software will run on all classes of machines without actually having those machines and playing games written for 4.77-MHz machines that are not playable at 8 MHz.

Pacer occupies 3.4K bytes of active memory and was written in machine language. Speeds can be changed by using a hot-key sequence, and the keyboard can be run at normal speed while the processor runs at another, according to a SoftSense spokesman. Pacer will sell for $49.95 and is available through the vendor.

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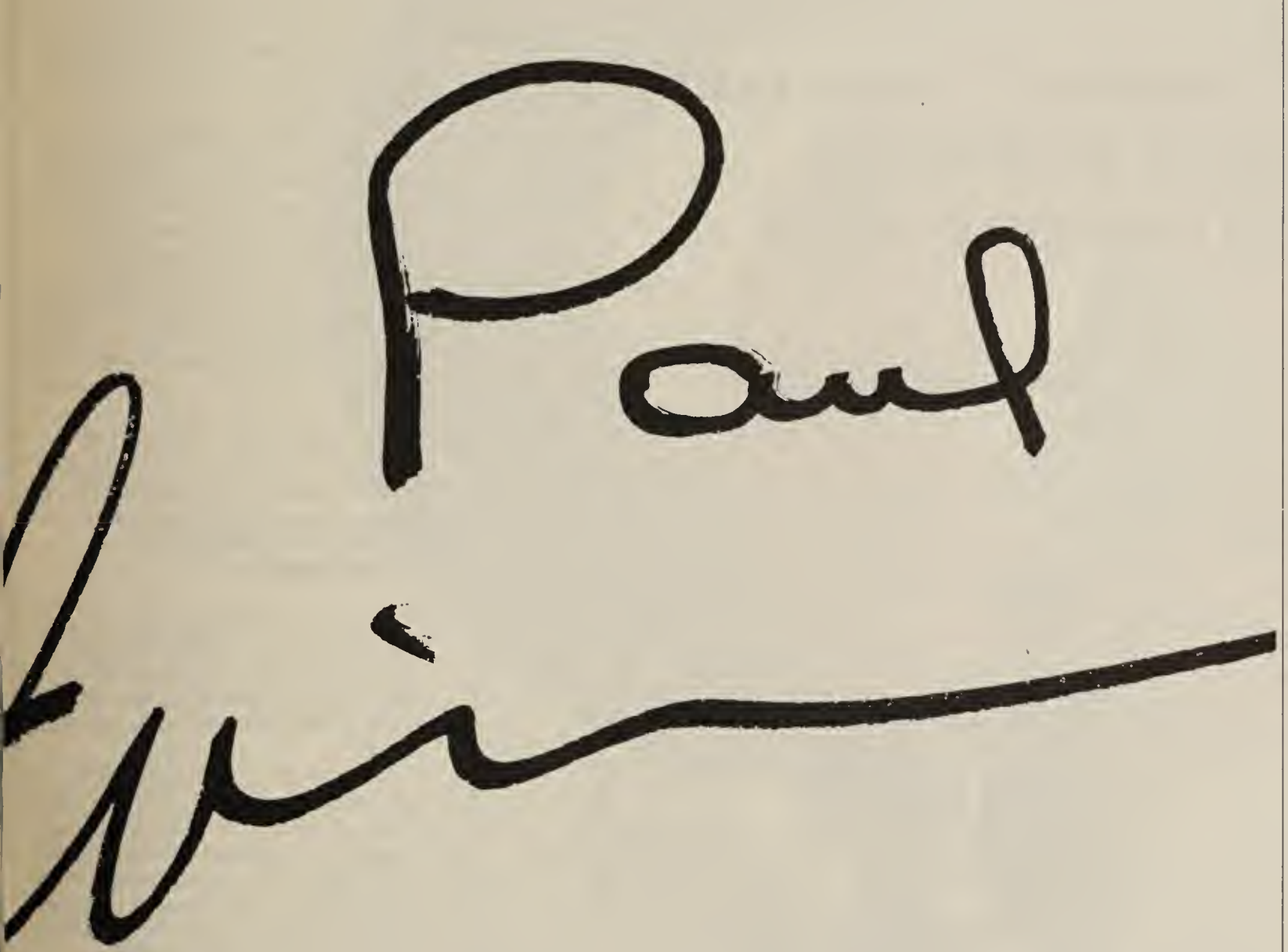


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# NEW PRODUCTS

## Systems

**Advanced Logic Research, Inc.** (ALR) has announced four models of its **ALR 386/2** IBM Personal Computer AT-compatible system based on the Intel Corp. 80386.

The Model 10 features an ALR-designed 386 system board with 1M byte of 32-bit random-access memory (RAM) expandable to 2M bytes, 1.2M-byte floppy disk drive, one serial port, one parallel port and a 101-key expandable keyboard. The ALR 386/2 Models 40, 80 and 130 all feature hard disk drives of 40M, 80M and 130M bytes, respectively; 2M bytes of 32-bit RAM; and a hard-disk controller with on-board full-track disk caching.

Prices for the ADR 386/2 family range from $1,990 to $7,299.

Advanced Logic Research, 10 Chrysler, Irvine, Calif. 92718.

## Software applications packages

A color slide software package that is said to allow users of the Apple Computer, Inc. Macintosh personal computer to create 35mm slides and overhead transparencies from Macdraw files has been introduced by **20/20 Data Systems, Inc.**

**Carousel** is a free-form slide creation package featuring a selection of 256 colors, gradient color-ramping techniques and simplified text placement. Once the slides are designed, turnkey processing is handled via a 24-hour modem connection to Stokes Slide Services, Inc. in Austin, Texas. Slides with 2,000-line resolution are available for $7 per slide, slides with 4,000 line resolution cost $14 per slide.

The Carousel package costs $249.

20/20 Data Systems, 7000 Cameron Road, Austin, Texas 78752.

## Software utilities

A hard-disk backup utility for the Apple Computer, Inc. Macintosh has been announced by **Design Software, Inc.**

**DS Backup** is said to permit users to copy the contents of a Macintosh hard disk to a set of floppy disks or to another hard disk drive. The utility runs on all Macintosh computers and most Macintosh compatible hard disks. According to the vendor, it can backup data from one Macintosh to another across Apple's Appletalk network.

Users can backup and restore an entire hard disk, selected directories and files, or just files that have been changed since the last backup session.

DS Backup is priced at $79.95.

Design Software, 1275 W. Roosevelt Road, W. Chicago, Ill. 60185.

## Software enhancements

**Mortice Kern Systems, Inc.** has enhanced its **MKS Toolkit**, software designed to provide the personal computer user with the power of Unix commands within a Microsoft Corp. MS- or IBM PC-DOS environment.

The tool kit is a package of more than 110 utilities. Version 2.2 features a complete implementation of the VI/EX full-screen Unix editor with the capability of handling international character sets including French, German and Spanish.

Other features include an implementation of AT&T's Unix System V Korn shell and an enhanced version of the AWK fourth-generation language as well as utilities for data compression and file encryption.

MKS Toolkit Version 2.2 costs $139.

Mortice Kern Systems, 43 Bridgeport Road E., Waterloo, Ont., Canada N2J 2J4.

## Printers/Plotters/ Peripherals

**Cordata Technologies, Inc.** has reduced the prices of its **Intellipress** electronic desktop publishing systems, its **Desktop Printshop** laser printers and its line of **80286-based personal computers.**

The Intellipress, fully integrated systems offered with either Xerox Corp.'s Ventura Publisher or Aldus Corp.'s PC Pagemaker preinstalled on hard disk, now cost $8,995. An optional scanner costs $1,495. The LP-300 Desktop Printshop laser printer was reduced by 27% from $2,995 to $2,195. The LP-300X was reduced by 30% from $3,895 to $2,695.

The PCs now cost from $1,895 for the ATD-8-Q to $2,495 for the ATP-8-Q20.

Cordata, 20001 Corporate Center Drive, Newbury Park, Calif. 91320.

## Board-level devices

**STB Systems, Inc.** has introduced the **Color/Mono** video adapter.

The dual-purpose Color/Mono adapter is said to support IBM Color Graphics Adapter modes as well as IBM Monochrome Display Adapter modes. The switch-selectable adapter also provides an IBM-compatible parallel-printer port and an optional battery-operated clock/calendar.

The adapter supports graphic resolutions to 640 by 200 pixels in two colors and 320 by 200 pixels in four colors.

The Color/Mono adapter is priced at $149. The clock/calendar option costs $29.95.

STB Systems, Suite 210, 1651 N. Glenville, Richardson, Texas 75081.


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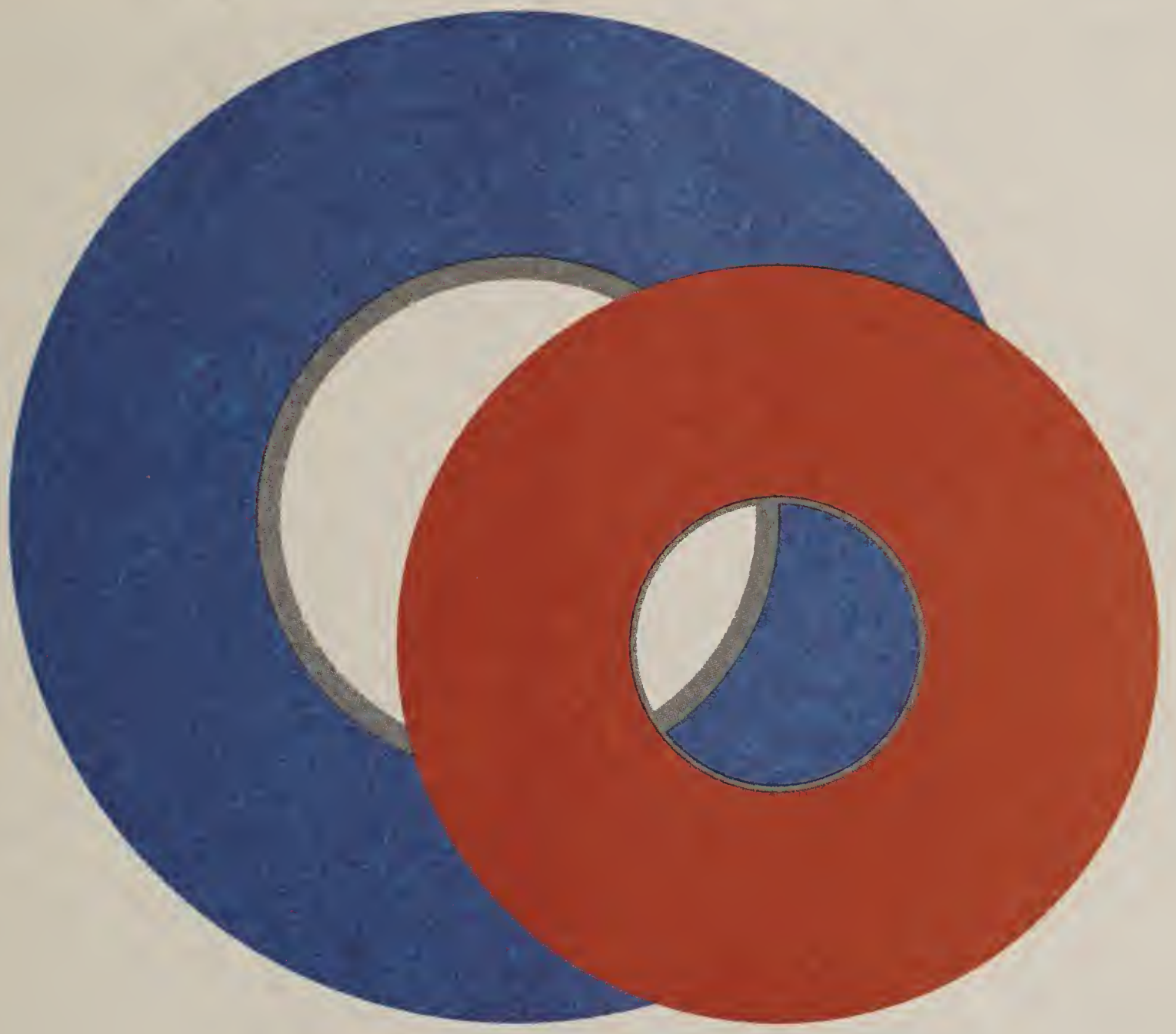

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And for all this speed, you won't sacrifice a single iota of compatibility. Because in addition to running thousands of PC applications, the PC's Limited 386 also works with the PC hardware and peripherals you already have.

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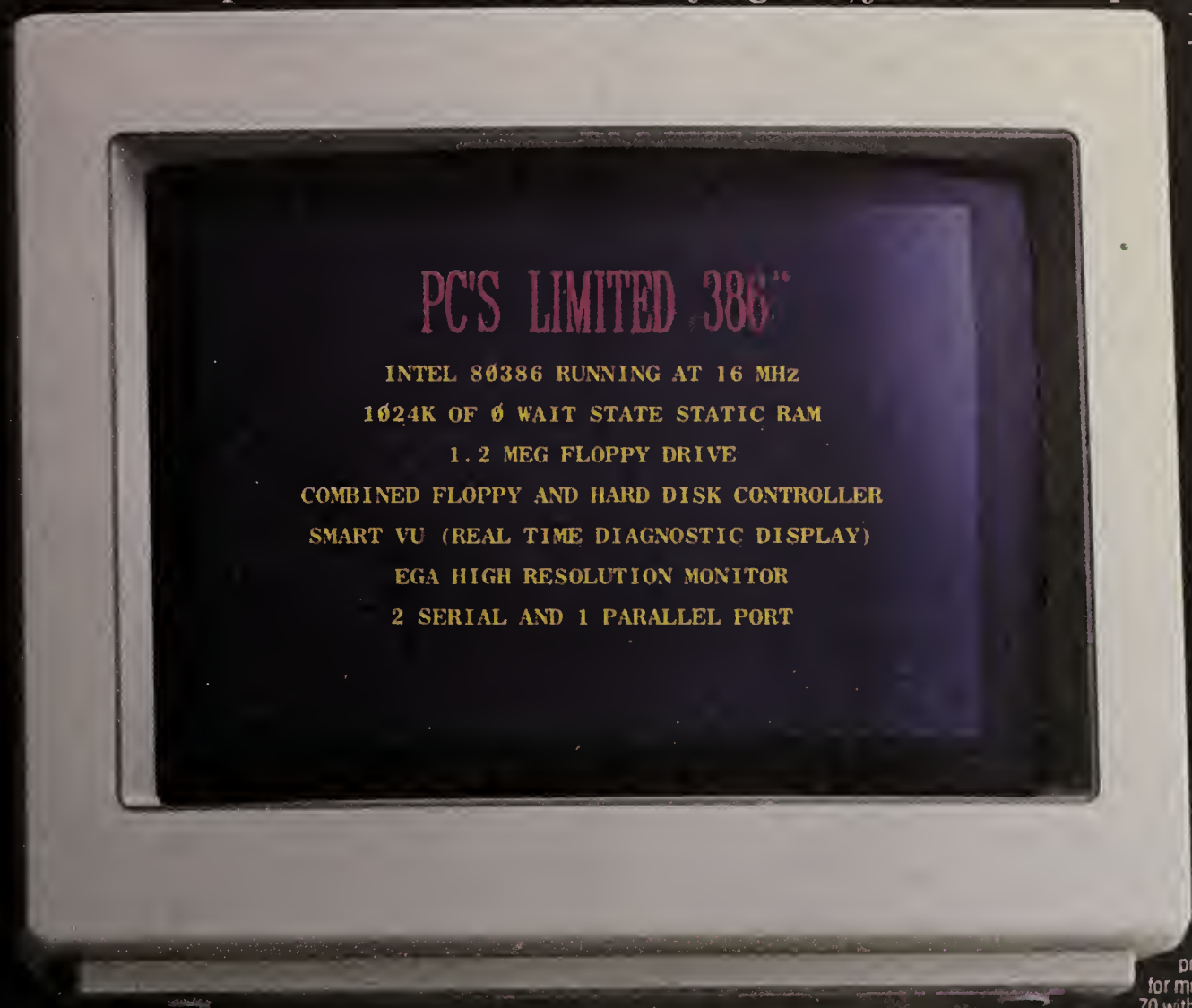
So to all of you who already bought Compaq's 386, you have our condolences.

And to those of you who are thinking of buying one, you have our phone number: 1-800-426-5150.




*PC's Limited 386 Benchmark Study is available upon written request.

**Based on current suggested retail price, effective May 1st for most comparable system: Compaq Model 70 with a 70 Meg hard drive list price $8,699. PC's Limited 386[16] with a 70 Meg hard drive list price $5,399.

PC'S LIMITED 386[16]

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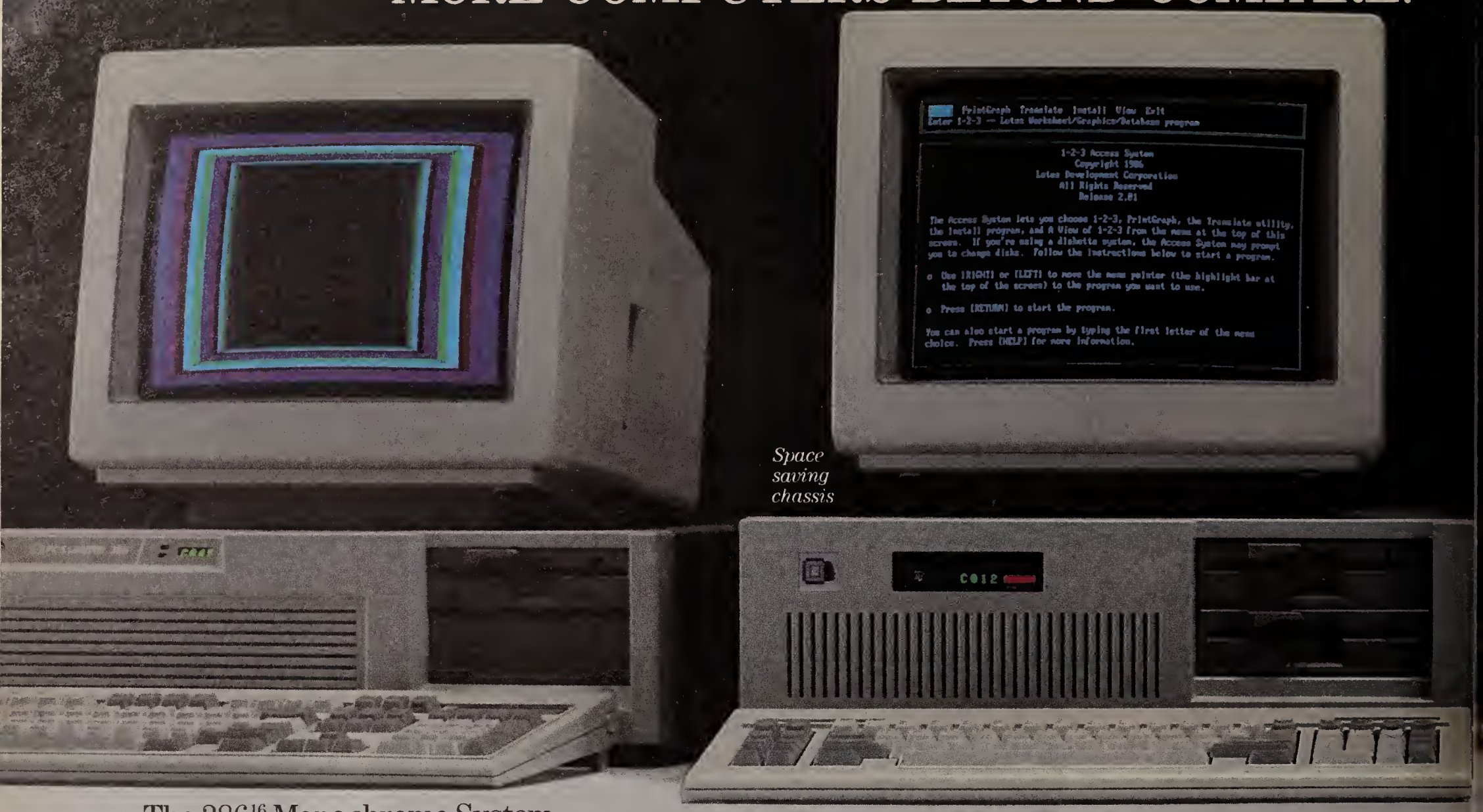


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192 watt Power Supply
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Hercules compatible Monochrome Graphics card
2 Serial and 2 Parallel ports
High Resolution Monochrome Monitor
Standard chassis
Smart Vu™ (Real Time Diagnostic Display)
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With a 70 Meg, 28 MS hard drive ..... $2,999

## The 286[12] EGA Color System

*The above system with the following substitutions.*
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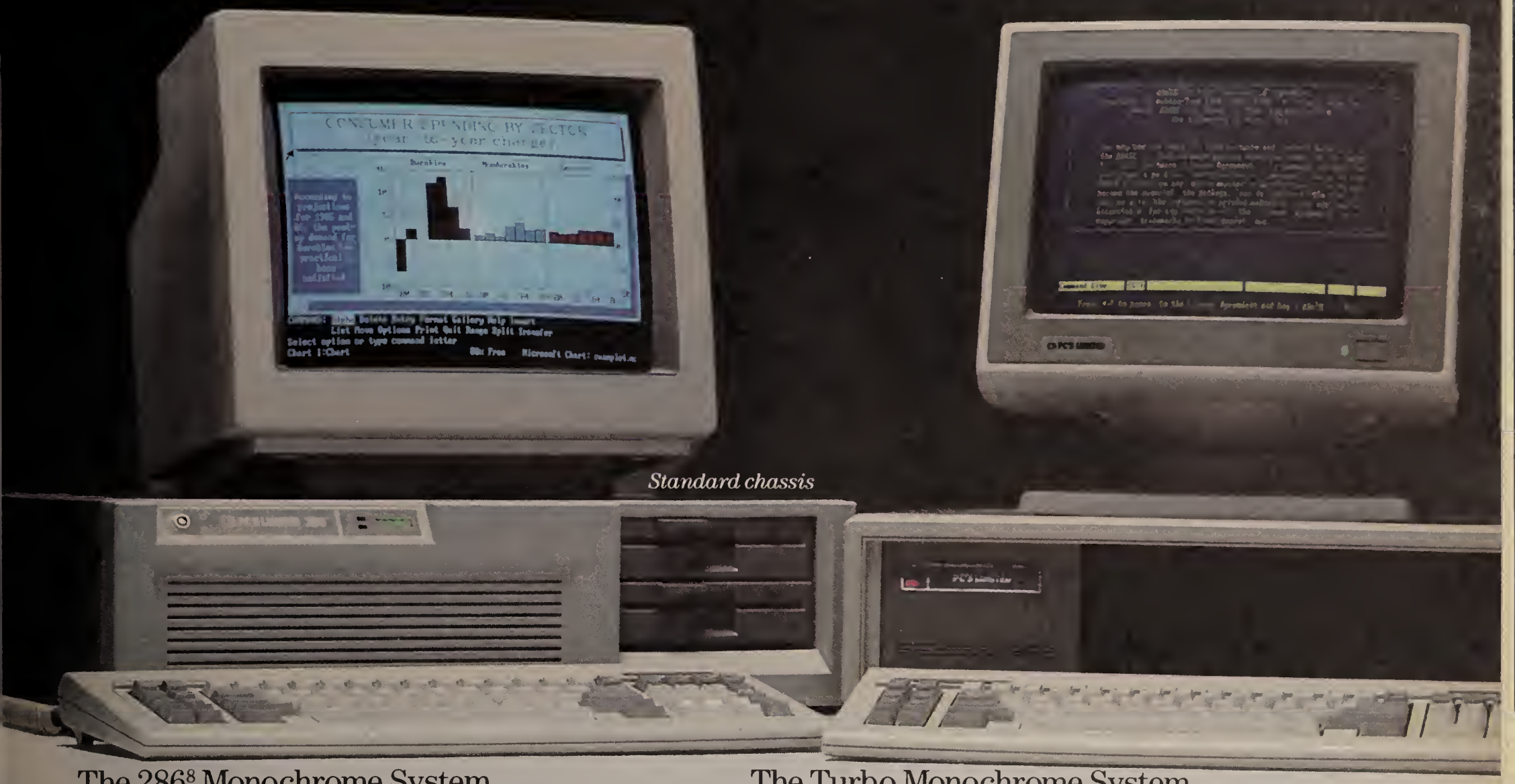

*Standard chassis*

## The 286[8] Monochrome System

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Clock/Calendar with battery backup
Hercules compatible Monochrome Graphics card
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## The Turbo EGA Color System

*The above system with the following substitutions.*
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DATA STREAM

*Marvin Chartoff*

## X.25 nets to come of age

Products in the CCITT X.25 packet-switching market will undergo major changes in the next few years in order to respond to the growing sophistication of data communications managers and the evolving networking requirements of the user community.

These changes include the integration of packet-switched networks with other wide-area networking media as well as with higher level communications protocols, such as IBM's Systems Network Architecture (SNA) and the Open Systems Interconnect (OSI) communications standard. Behind these developments is users' growing desire to manage all components of their wide-area networks as one system and to use packet-switched networks as a cost-effective link between local, intrasite networks.

More and more corporations are using X.25 networks as a way to link SNA systems with devices that use asynchronous and other non-SNA communications protocols. And while OSI implementations are primarily local-area networks now, wide-area packet-switch networks such as the Defense Data Network (DDN) and other government networks will be required

*Continued on page 42*

# The ABCs of networking

*MIS battles budget constraints, product overkill on first LAN project*

BY ELISABETH HORWITT
CW STAFF

DALLAS — In the throes of its first local-area network (LAN) installation, Dallas Market Center Co.'s MIS department is finding out how tough it can be to explain to vendors what exactly it wants, especially when it has an economy-minded senior management looking over its shoulder.

Michael Winter, vice-president of the firm's information services group and Microsystems Consultant Cookie Myers are using a cautious — bordering on sneaky — approach to purchasing a LAN for their company. "We don't have needs that are flashy enough to convince top management about big savings; printer sharing is our only justification right now," Winter says. "Executives do not use PCs and are not technology-minded, so we have to find our own funding."

This means tacking a LAN purchase onto an already-approved word processing acquisition — which in turn means keeping costs to a minimum, at least initially. Once the network is in place, however, Winter says his group hopes to add other useful applications such as moving documents between dedicated word processors and IBM Personal Computers, micro-to-mainframe access, simple file sharing and electronic mail.

Reportedly the world's largest wholesale merchandise market, Dallas Market Center holds a number of trade shows "that require a huge amount of direct mail," Myers notes. Users in charge of mailings for a given show could use the network for shared access to files and a laser printer so that the company could start doing the mailings in-house "instead of having to farm them out to direct services for thousands of dollars, as we do now," Myers explains.

The network could also pro-

*Continued on page 43*

# Study: VSAT numbers, features grow

BY ELISABETH HORWITT
CW STAFF

The very small-aperture terminal (VSAT) satellite networking market is undergoing a shakeout as it moves into a new generation of value-added products, according to a recent report by New York research firm Link Resources Corp.

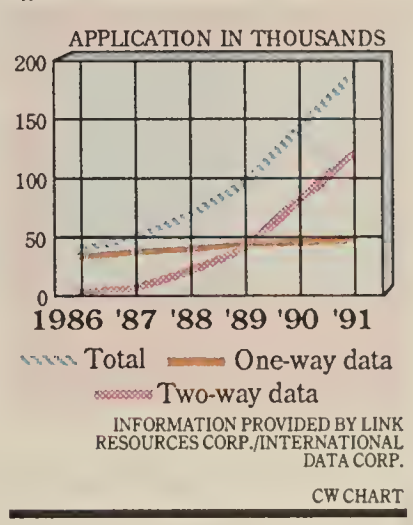
VSATs are small satellite earth dishes that approximately two years ago helped revitalize the satellite communications market by providing corporations with a cost-effective way to link a central site to remote offices. Other contributing factors to an upswing in satellite networking sales were a glut of satellite transponder space, resulting in lower bandwidth prices, and climbing leased-line rates that forced users to seek inexpensive alternatives.

According to the Link report, VSATs are the fastest growing segment of the data broadcasting equipment market, which supplies low-cost alternatives to leased-line and dial-up services for one-way, point-to-multipoint data delivery. Two other segments are digital microwave dishes and equipment for transmitting over the FM-Subsidiary Communications Authority frequency. The total market, currently $1.5 billion, will grow more than 25% annually to $5

*Continued on page 43*

**Satellite networks going interactive**

*Two-way satellite terminal installations are expected to take off in the late 1980s*




INFORMATION PROVIDED BY LINK RESOURCES CORP./INTERNATIONAL DATA CORP.

CW CHART

# PCs can do LU6.2 on Irma

LAGUNA HILLS, Calif. — Network Software Associates, Inc. recently introduced software products said to allow IBM Personal Computers and compatibles equipped with Digital Communications Associates, Inc.'s Irma boards to communicate via IBM's LU6.2 and RJE protocols.

Adapt3274 LU6.2/I is said to allow the PC to communicate with a mainframe using LU6.2/Advanced Program-to-Program Communications functions via an IBM 3274 or 3174 cluster controller.

Adapt3274 RJE/I emulates an IBM 3770 RJE workstation. It reportedly allows Irma-equipped PCs attached to a 3274 or 3174 controller to communicate with an IBM mainframe running JES, Power or another VTAM operating system.

Adapt3274 LU6.2/I costs $485; Adapt3274 RJE/I costs $985. Both products are available now.

**Inside**


- Synoptics adds 10M bit/sec. Ethernet to Lattisnet family. Page 42.
- Laserdata announces Ethernet-compatible document-management net. Page 44.
- Applied Voice Technology rolls out modular voice- and call-processing system. Page 44.



## COBOL with network support now a standard feature. Complete networking syntax in new Micro Focus products.

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# X.25 nets

FROM PAGE 47

by the Government Open Systems Interconnection Procurement specification to provide full support of OSI protocols in the future.

However, packet switches may need added throughput and bandwidth capacity to meet these demands. SNA adds control overhead, and the steady-stream nature of synchronous communications puts an added load on a switch, as does the additional overhead represented by OSI packet headers.

Some vendors, such as Telenet Communications Corp. and BBN Communications Corp., are moving toward integration of packet switches with T1 switches that support 1.5M bit/sec. data rates. One emerging application is for a packet assembler/disassembler (PAD) to be hooked up to a T1 multiplexer so that X.25 packets can be sent along one or more subchannels within a T1 link.

Packet switches are being integrated with a variety of other networking devices, including satellite terminals and low-speed modems. But while users gain functionality, they also need a system that provides access and error control, monitoring, dynamic bandwidth allocation, statistics gathering and other network management functions across disparate communications devices.

Today, many corporate networks consist of a wide variety of vendors' multiplexers, modems and switches — each with its own proprietary network management system. As a result, the network control center quickly becomes a data center itself. With the addition of a packet-switch network, another network management system is added.

Because the packet switches are the most ubiquitous components of the network, the X.25 packet-switching network management system should be the central core of a network control center, integrating the network management information from modem-diagnostic and performance-monitoring systems and host-based network management. With all relevant network status information being collected at a central point, finger-pointing is reduced and the opportunity to incorporate artificial intelligence into the network control center becomes a very real possibility.

The broadening role of the packet switch in corporate networking is both a potential boon and a threat to vendors, whose products will have to support the increased throughput, bandwidth and network management integration. As systems integrators, vendors will need expert knowledge of a wide variety of transmission and network management systems. Thus, we can expect a weeding-out of many smaller packet-switch vendors that will not have the resources to meet the demands of an increasingly sophisticated market.

---

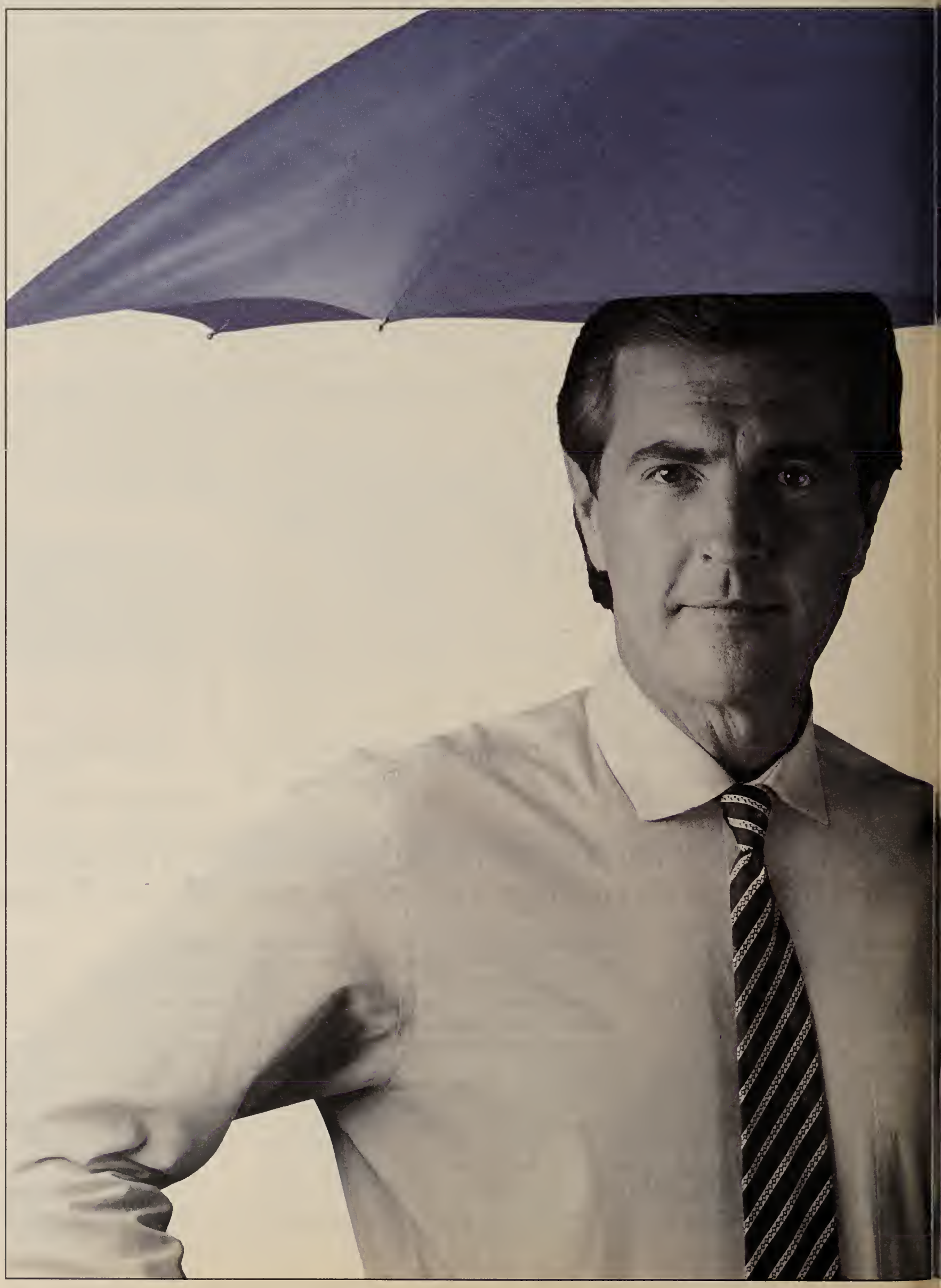
Chartoff is a group manager at Fairfax, Va., consulting firm Network Strategies, Inc.

# Firm extends premises-wiring family

MOUNTAIN VIEW, Calif. — Synoptics Communications, Inc. has broadened its Lattisnet product family to include a 10M bit/sec. Ethernet over fiber optics and a concentrator for small work groups.

The expanded Lattisnet product family provides a flexible, cost-effective premises-wiring scheme that allows the use of both fiber optics and twisted-pair wiring to connect large and small work groups within a building, the company said.

The wiring system provides up to 32 connections in a Synoptics Premises Concentrator. The smaller Departmental Concentrator, which connects small work groups to an existing Lattisnet, supports up to 12 fiber connections or up to 18 connections of shielded twisted-pair cabling conforming to the IBM Cabling System specifications. Both products are available now.



# VSATs

FROM PAGE 41

billion by 1990, Link estimated.

Last year, the VSAT market lost two major potential customers when Federal Express Corp. pulled out of Zapmail and the IBM-Merrill Lynch & Co. Imnet venture folded. However, "the current woes in the VSAT market point less to a lack of legitimacy than to necessary growing pains in a very competitive market for carrying data traffic," the report states.

With the "virtual saturation" of the market for one-way VSAT dishes, vendors are moving into interactive and value-added niches, according to the report. Interactive VSAT networks emerged last year as cost-effective vehicles for applications such as credit- and debit-card retail systems and hotel and travel reservation services.

### Interest growing

Equatorial Communications Co., a pioneer in one-way VSAT networking services that suffered heavy losses when the demand for those services declined, recently announced several sales of two-way VSAT offerings. Federal Express has purchased a stake in Tridom Corp., an Atlanta-based two-way satellite networking company that targets the financial service market.

The VSAT market recently received the mixed blessing of two powerful entries: AT&T, with its Skynet service, and GTE Corp. subsidiary GTE Spacenet Corp., which recently won a $40 million contract to build a 2,000-site system for K Mart Corp. AT&T, whose low-priced initial offering drew accusations of cross-subsidization from its competitors, has had comparatively little impact on the market, according to Link. GTE Spacenet, however, is becoming the preferred provider of VSAT transponder capacity, Link said.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# ABCs

FROM PAGE 41

vide a shared mainframe host gateway for financial analysts on PCs, according to Winter. The group currently is leaning toward a network based on RS-232 ports, handling data rates in the 1M to 4M bit/sec. range that costs between $100 to $300 per workstation. A twisted-pair network is the preferred medium, since "I can't justify coaxial cable-based networks . . . as a way for someone to get at a printer," Winter notes. Currently under consideration are AT&T's Starlan and Western Digital Corp.'s twisted-pair network.

Since the company currently is looking to either Xerox Corp. or CPT Corp. for its new word processing system, Winter says he was interested to learn that both of those vendors' products provide file sharing across a network. Having to buy "a big, expensive server" separately would be hard on his budget, Winter says.

However, not all vendors were as encouraging when Winter explained his needs. One told him that he would need $50,000 just to start. Failure to find one source for his company's networking needs has not discouraged Winter, however: "Everything is gateways; we'll just have to tie several vendors' products together," he says. "We're not expecting one-button functionality to get from a PC to a word processor or to a mainframe, but neither are we going to settle for something that requires 50 manuals."

The number of networking products and options available is a serious problem for Myers. "Every time I read about yet another LAN introduction, I want to scream," she says.

While the company is an IBM mainframe shop, and Winter has talked with IBM about networking, he says he feels confused about the company's networking direction. "I have a Systems Network Architecture network with terminals all over, but it's hard to see where the new SNA products fit into the picture," Winter says. "The need for true peer-to-peer communications for us could be five or 10 years away. I figure we'll make a small investment today in twisted-pair and let the big guys fight out the standards."

## NEW PRODUCTS

### Local-area network hardware

An Ethernet-compatible electronic document management network, **I/Net**, has been introduced by **Laserdata, Inc.** for use with its Laserview electronic document management system.

I/Net provides multiuser access to optically stored electronic document images and uses a single high-resolution monitor to display both documents and data. It is Ethernet-based and compatible with personal computing networking hardware from 3Com Corp.

I/Net is implemented using dual file servers. The data base files reside on a magnetic-disk server. The digitally stored document images reside on an optical-disk server.

Laserview systems start at $50,000.

Laserdata, 10 Technology Drive, Lowell, Mass. 01851.

### Network management

A secondary-channel data service unit (DSU) said to provide network management capability has been introduced by **Universal Data Systems.**

The **DDS-2 96**'s primary channel provides a user with full-duplex, synchronous, end-to-end digital transmission at rates of 2,400, 4.8K and 9.6K bit/sec. It accepts both synchronous and asynchronous data. An independent, asynchronous secondary channel operates at data rates of 300, 150 or 110 bit/sec.

The DSU is connected to the network over a four-wire unloaded twisted-pair cable. It can be used in point-to-point or multipoint applications.

The DDS-2 96 costs $750.

Universal Data Systems, 5000 Bradford Drive, Huntsville, Ala. 35805.

### Network services

**Western Union Corp.** has instituted a communications and information service for the insurance industry, targeted at users served by IBM's Information Network service.

**Inslink** provides communications between insurance companies and agents as well as messaging and information retrieval capabilities. The service automatically reformats policy data transmissions originating in the Agent Company Organization for Research and Development format. Agents using Inslink can transmit one message to a variety of company systems.

The cost of using Inslink is approximately 45 to 55 cents per page. A one-time fee of $10,000 to $40,000 is charged for each customer's data translation table.

Western Union, One Lake St., Upper Saddle River, N.J. 07458.

### Customer-premise equipment

A modular voice- and call-processing system called **Callxpress** has been announced by **Applied Voice Technology, Inc.**

Callxpress is available in four- and eight-port models. The four-port model accommodates up to 200 users and can store up to 6½ hours of messages. The eight-port model can accommodate 500 users and 13 hours of voice storage. According to the vendor, any combination of voice mail and automated attendant modules is available.

Modules include automated attendant, voice mail, transaction and audiotex. Features include automatic call answering and call routing.

Callxpress is priced from about $7,500 to $14,500.

Applied Voice Technology, 2445 140th Ave. N.E., Bellevue, Wash. 98005.

### Links

A gateway software product said to provide IBM mainframe users with access to 10 Western Union Corp. messaging services has been introduced by **Wizard Computer Products**.

**Wizard Link** connects IBM mainframes to Western Union's Easylink service. Messaging services available include telex, mailgram messages, cablegrams, computer letters, telegrams, overnight express documents, priority letters and mail to other Easylink mailboxes.

Wizard Link runs under CICS. Transmission is through an AT&T 201C or compatible modem running at 2400 bit/sec. The stand-alone system costs $3,000. As an add-on to Wizard Mail, it costs $1,900.

Wizard Computer Products, P.O. Box 1867, Greenville, S.C. 29602.

### Cabling

**Trans-M Corp.** has introduced the **Universal Connector RS-232-RJ12**, designed for configuring two or more computers, workstations and peripherals.

The Universal Connector is sold in pairs with a 25-ft plug-in telephone cable. It is said to multiplex eight wires to six wires.

The vendor said each connector has two switches that can be switched between Transmit Data and Recieve Data.

A pair, including telephone wire, costs $24.95.

Trans-M, 28 Blacksmith Drive, Medfield, Mass. 02052.


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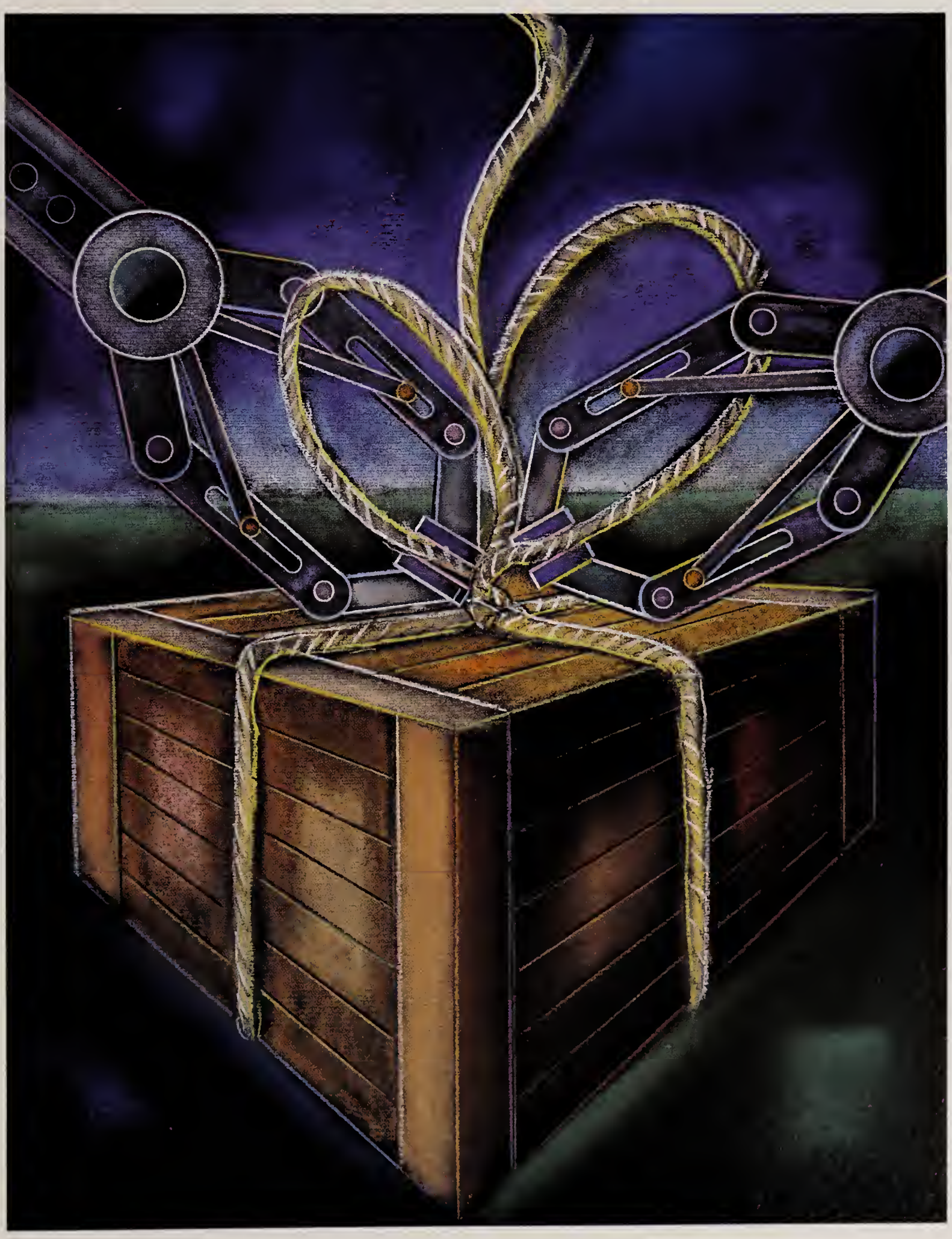
SPOTLIGHT

# MANUFACTURING TECHNOLOGY



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**SENIOR EDITOR**
Joanne Kelleher

**ASSOCIATE EDITOR**
Penny Janzen

**RESEARCHER**
Sally Cusack

**DESIGN EDITOR**
Marjorie Magowan

**ASSISTANT RESEARCHER**
Bonnie MacKeil

Cover illustration:
Andrzej Dudzinski

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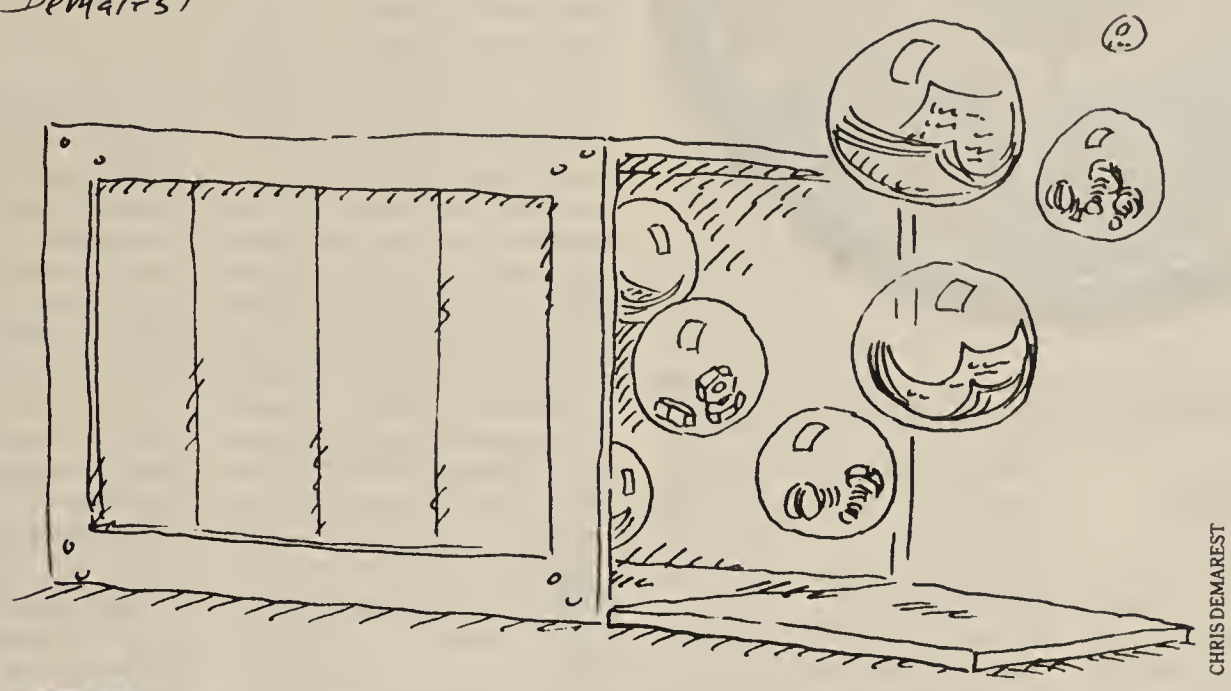
**What makes CIM elusive is that it isn't a product that can be put into a box. Its real core is not equipment but process.**

# IN PURSUIT OF INTEGRATION

MICKEY WILLIAMSON




Stripped of all the fancy talk, computer-integrated manufacturing (CIM) is nothing more than superlative system design. The system, in this case, is an entire manufacturing enterprise: from computer-aided design (CAD) through finished product, from administrative offices to factory floor and even, in the ideal, from a manufacturer's suppliers to its customers.

That may be easy to say, but creating a truly integrated manufacturing system is extremely difficult to do. So difficult, in fact, that no U.S. manufacturer has done it yet. According to Julie Pingry, editor of the "CIM Strategies" newsletter, "You can't find a single company anywhere that has what people think of as a comprehensive CIM operation." The technology exists, a sufficiently comprehensive methodology exists, but, experts say, a massive change in attitude will have to occur before truly integrated factories develop in this part of the world.

The term "computer-integrated manufacturing" suggests various things to various people. Just as CIM in this country is unlikely to ever be as all-inclusive as it is in Japan, where some manufacturers are linked to their suppliers and customers in a single system, the concept takes on different shapes when viewed in light of individual company situations.

To some, CIM is a way of linking already-automated pieces of factory equipment; to others, it means connecting the shop floor with corporate financial management systems. CIM can also mean coupling design engineering stations with flexible manufacturing systems or hooking into a supplier's order entry system as part of a just-in-time inventory management program or being part of a customer's just-in-time scheme on the other end of the production cycle.

It is a mistake, however, to think of CIM as just a set of technologies. "One of the shortcomings of CIM as a buzzword is that it sounds like something you can go out and buy," Pingry says. Actually, the components of a fully integrated manufacturing system are too numerous and too varied to ever be supplied by a single vendor, and organizations intending to embark on a CIM program must be prepared to do some of their own integration and customization to get the system to work. And, at its heart, CIM is not machinery but an expression of a corporate philosophy and strategy.

Charles Savage, a Wellesley, Mass.-based manufacturing automation consultant and principal at D. Appleton Co., distinguishes between two levels of CIM, which he designates "CIM I" and "CIM II." CIM I, he says, is actually computer-interfaced manufacturing. It concentrates on building physical connections among the various functional departments in an organization so that they can pass files back and forth among themselves. Taken only to this level, CIM can create more problems than it solves.

Each department, Savage explains, has its own way of looking at the world and its own language. "Words that have one meaning in one [departmental] context often mean something different in another," he says. Without interfaces between departments, people make translations as a matter of course. "If you bypass the people and try to send digital information directly from one department to another," he warns, "chances are you're going to have problems."

In order for the integrated manufacturing concept to work, Savage says, there must also be

Williamson is a technical journalist based in Warwick, Mass. She writes frequently on advanced computing techniques.

## Computer-Integrated Manufacturing

*A cross-sectional view of enterprise elements*

CIM "Wheel" developed by the Technical Council of the Computer and Automated Systems Association of SME (CASA/SME) — Copyright 1985 CASA/SME Second Edition, Revised November 5, 1985.

# Integration

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"computer-integrative management of the manufacturing enterprise," or what he calls CIM II. "It isn't as though one day you're not integrated and the next day you are," he says. Integration is an ongoing process with management at its core.

### Three infrastructures

Savage describes three infrastructures that make up a CIM system: the technological infrastructure that creates the connection among working units in the manufacturing enterprise; the referential infrastructure in which a data item has the same meaning regardless of the data base in which it resides; and an attitudinal infrastructure in which everyone in the organization shares a vision of where the enterprise is headed and how to get there.

It is pointless, for example, to integrate engineering design workstations with equipment on the manufacturing floor if design engineers have no interest in designing for manufacturability and consider the suggestions of manufacturing engineers as the whims of an inferior caste. Savage says the sharp divisions between functioning units in a manufacturing organization and between workers and managers are at the core of America's industrial malaise. "If we built buildings like we define jobs, the ceilings would be four feet high, and people would have to walk around in a stooped mode," he says.

The need for revitalization of the manufacturing sector is a theme repeatedly sounded by CIM proponents. If the U.S. is to remain competitive in the global marketplace, proponents say, the country must rethink its methods.

Joel Orr of Orr Associates, Inc. in Great Falls, Va., attributes the focus on CIM to concern over the "radical erosion" of the U.S "post-World War II position of kingship in the world manufacturing economy." He disputes the common prediction that the U.S. will soon become a service economy. To remain viable, Orr explains, a nation must create wealth, not just move money around as it does when providing services. And the only ways to create wealth are through agriculture and manufacturing. "We're not going to become a nation of service industries," he says. "If we go too far along that path, the U.S. as we know it will cease to exist. Somebody will simply walk in and take over."

We need to build more flexibility into our system. When gasoline prices soared in the 1970s, demand intensified for economy automobiles. It took U.S. automakers five years to catch up with the marketplace, largely because of the lack of integration among automotive design, tooling and manufacturing functions. Meanwhile, overseas automakers virtually walked away with the American car market.

We also need to cut costs. "We're in terrible shape if we compare ourselves with the Japanese just in the area of overhead," says George Sibbald, a principal in the consulting firm Genovation, Inc. in South San Francisco, Calif. "We have four times as many middle managers as the Japanese, and we pay them four times as much. That's a sixteenfold deficit when we go out in the marketplace."

Planning for CIM, Sibbald maintains, often leads to a simplification of the manufacturing process — even if the company never implements its integration plan. In fact, he says, the need for automation itself, as well as the need for integration, often decreases when an organization takes a good hard look at the way it does things and decides to streamline and simplify its operations.

In a forthcoming book, *Organismic Management*, Orr describes the engineering and manufacturing departments in a typical organization as "a pair of pyramids that meet only at the level of the organization's president. There is a gap between them from the ground up to the top." Orr, also coauthor of *The CIM Handbook* (McGraw-Hill Book Co., 1987), says there would be no such gap in a fully integrated company. "There would be a single structure. Whether it would be pyramidal is another question entirely. I'm not certain that the pyramidal structure is well suited for the implementation of CIM," he says.

### Building bridges

In most American organizations, then, cultural change will be a necessary part of integrating the manufacturing enterprise. So, too, will be building bridges between all of the activities that combine to form the business. In his book, *Cimplan, The Systematic Approach to Factory Automation* (Cutter Information Services, 1986), Lee Hales, manager of the Systecon industrial consulting division of Coopers & Lybrand, identifies five major stages of manufacturing operations and 15 functions within them that would be linked in an internally integrated manufacturing system:

- **Engineering.**
  - Design.
  - Analysis.
  - Documentation.
- **Planning.**
  - Parts planning.
  - Production and inventory planning.
- **Control.**
  - Process, shop and materials control.
  - Inspection, testing and quality.
- **Production.**
  - Parts and tool production.
  - Assembly.
  - Handling and storage.
- **Support.**
  - Facilities engineering and maintenance.
  - Personnel management.
  - Data processing.
  - Order processing.
  - Accounting.

Associated with these functions are the hardware and software that must be linked to form an integrated whole — mainframes, minicomputers and micros, programmable controllers, automatic test equipment, robots, data collection equipment such as bar code and laser beam readers, applications for manufacturing resource planning, simulation, quality assurance, control of individual manufacturing tools and processes, administrative applications such as accounting and human resource management, decision support and data base management software. Add to these the office and factory networks and their associated servers and software, and you have the daunting picture that so often keeps companies from tackling a CIM planning project.

> "WHAT YOU want to do is create one view of the product and process and then use that view at each stage of the operation."
>
> CHARLES SAVAGE
> D. APPLETON CO.

And building bridges is not enough. If the information that is coming across those bridges is not in a language that all parts of the system can understand, confusion is often the result.

Savage tells of one company that has seven different ways to list the same parts, each way determined by the needs of a different department. "What you want to do," he says, "is create one view of the product and the process and then use that view at each succeeding stage of the operation."

One means for doing this is being pioneered by the aerospace industry in a project called Product Data Exchange Specification (PDES), funded by the U.S. Air Force.

PDES is a standard way of describing parts and processes used in a variety of industrial organizations.

This kind of standardization facilitates dialogue among functional units within a company. It also eases communications between organizations, allowing a company to place orders with its suppliers and fill orders from its customers by communicating digitally rather than through hard-copy purchase orders.

PDES, Savage says, provides "a common reference model so that when companies cut the part, service the part or price the part, they'll all be talking about the same thing."

Driven by the desire for accurate digital communications, the most forward-looking companies are beginning to treat data as a corporate asset — to the extent of creating a data administrator's position, whose job it is to create standard definitions for items of data, regardless of the

## CASA/SME awards

**1986**

*Martin Marietta Energy Systems, Inc. Y-12 Plant Oak Ridge, Tenn.*

The Y-12 Plant was credited by the Computer and Automated Systems Association of the Society of Manufacturing Engineers (CASA/SME) as an example of a comprehensive computer-integrated manufacturing (CIM) program that reflected top-level strategic planning and grass-roots implementation. Starting in 1978 with a commissioned study of the still-nascent computer-aided design and manufacturing technologies, the Y-12 Plant moved forward to implement a state-of-the-art CIM installation.

**1985**

*Cone Drive Operations of Ex-Cell-O Corp. Traverse City, Mich.*

Labor and material costs, a high inventory investment and foreign competition compelled Cone Drive to adopt CIM, according to CASA/SME, and the results were, and continue to be, impressive. Among the benefits attributed to CIM technology and practices are reduced manufacturing costs, improved quality and increased efficiency in both manufacturing throughput and integrity of deliveries.

**1984**

*General Electric Co. Steam Turbine-Generator Operations Schenectady, N.Y.*

General Electric's CIM system in Schenectady was, according to CASA/SME, formulated in recognition of a changing marketplace. In essence, the company devised a master plan that would link the total operation — from price quotation through engineering and manufacturing and all the way to finance — in a common, integrated data base.

location or architecture of the data base in which they reside. "I'll know we've made it when finance puts an asset number on a datum the same way it puts one on a table or a computer," Savage says.

Control over the corporate data dictionary, Savage adds, is "a new and burgeoning field," which he refers to as computer-aided data engineering, or CADE. "It's going to emerge in the 1990s," he predicts, "and that's when we're going to hit some pay dirt. It will make truer integration possible."

### Less paper, less cost

Other pieces of the CIM puzzle are starting to fall into place. One is group technology, a method of coding engineering drawings according to parts families so that the drawings can be retrieved when another engineer is to design a similar part.

> "IF YOU focus on body count or insist that every project in the plan show a 22% internal rate of return, you're not going to get CIM."
>
> LEE HALES
> SYSTECON

Today, most engineering drawings are handled as though they were done in a paper-based system. So, instead of looking through a library of shafts when a new one is needed, the engineer is likely to find it easier to start from scratch. The results, in addition to time wasted in redesign, include large inventories of similar parts that must be kept in stock for repairs, confusing and inaccurate parts lists and erroneous documentation — much of which could be avoided if an engineer were freed from the need to reinvent the wheel on each assignment.

Getting CAD-generated engineering drawings to communicate with other parts of the manufacturing system is another tricky hurdle. Just finding the starting point in a drawing can be difficult, especially for a machine shop that serves a number of customers.

An attempt to iron out the problems with this interface is being made in another Air Force-funded project being developed by LTV Corp. in Dallas and McDonnell Douglas Aerospace in St. Louis. McDonnell Douglas is a prime contractor to the Air Force in building B-1 bombers. LTV is a subcontractor. To date, LTV has succeeded in sending the design for a B-1 part created on its Automation Technology Products' Cimplex CAD system directly to McDonnell Douglas's computer-aided design and drafting system. There, the drawing is used to write a program for a numerical controller, which then produces and inspects the part.

All of this is performed digitally — a significant change from the more familiar practice of producing the design on a blueprint at McDonnell Douglas and then having people at LTV interpret the blueprint, write the numerical controller program, punch the program tape and proofread it.

The next part of the program, which will cost hundreds of thousands of dollars, calls for the two companies to reverse the process, with McDonnell Douglas sending the design to LTV and LTV using the digital data to produce the part.

According to Don Norwood, CIM programs manager at LTV, the companies anticipate a 90% reduction in design-to-production time. "The real payoff is that this can all be done and tested on a computer screen without ever making a part," Norwood says.

### Justifying the costs

In this way, piece by piece, forward-looking companies are moving to eliminate the remaining obstacles to fully integrated manufacturing systems. But the process will always be a slow one, according to Systecon's Hales. "To achieve significant levels of integration is typically a four- to five-year program," he says. That is one reason, he says, that management must pay close attention to rigorous cost justification.

"To sell it to the board of directors," Hales says, "you have to focus on what it's going to do for you in the marketplace. Will it increase sales or retain sales you might otherwise lose? Does it improve cost structure so that you can increase margins when sales are flat?"

Management, he continues, must take a long-term view of competitive position. "If you focus on body count or insist that every project in the plan show a 22% internal rate of return, you're not going to get CIM. Not all projects show those kinds of tangible returns. You have to be thinking strategically. You don't really know what return you've achieved until you have the integration in place and operating."

But Hales says he has no doubt the benefits exist. "We're not talking about 10% improvements," he says. "In some cases, we're talking about tenfold improvements in things like cycle time, time to market or time to implement introduction of a design change. Those results are real."

### CIM at DEC

Digital Equipment Corp. is a vendor of CIM building blocks that practices what it preaches.

*Continued on page S5*

# Artificial intelligence takes a stand on the factory floor

Artificial intelligence on the factory floor is usually equated with robotics, but that concept is much more limited than reality.

The fact is there are more commercial applications of AI technology in manufacturing than in any other field, including finance. Most recently, vision systems have been incorporated into the inspection process. And voice technology, sometimes coupled with natural language processing systems, is now being employed for hands-busy tasks such as physical inventory.

Until recently, the most advanced of these systems have been developed in-house and were proprietary. Companies that made the large investment necessary to develop them did so either to fix problems they would prefer the public knew nothing about or to give themselves a competitive edge that might evaporate if the competition knew the tools existed. Consequently, specifics about these advanced systems were usually embargoed.

> EXPERT systems technology was developed to tackle . . . the kind of situation that brings algorithmic programs to their knees.

But now a growing number of knowledge-based, or expert, systems are coming into public view as some companies lift the veils off their proprietary technology and as customizable commercial systems begin to hit the market.

The best known in-house expert system is Digital Equipment Corp.'s configuration expert, called R-1 during development at Carnegie-Mellon University and renamed Xcon when DEC assumed responsibility for its continued development. Working from customer orders, Xcon develops the configuration specifications for about 90% of all VAX computer systems that DEC ships and is reported to be saving the company some $18 million each year by reducing the number of components manufactured unnecessarily.

### What AI can do for you

Other companies are putting expert systems to work in scheduling, troubleshooting, decision support and quality inspection as well. Some of these tasks, of course, are already being handled by traditional applications built on a data base, so it is logical to ask why adding AI technology makes the jobs any better than using what exists now.

One answer is that expert systems technology was developed to tackle problems in which some information may be inexact or entirely missing — just the kind of situation that brings algorithmic programs to their knees. Another is that expert systems can take a great many factors into account in reaching a conclusion; human experts typically can handle only three or four considerations at a time. In addition, expert systems can do things that human beings cannot do — or can do only with great difficulty and expense.

For example, one company has a system that can compare X rays of a machined part with computer-aided design drawings and locate internal manufacturing flaws. When a defect is located, the system directs a precisely aimed laser blast into the part to prevent the flaw from migrating and then adds data about the problem and the remedy to the quality assurance report that moves with the part through the production process.

Ford Motor Co. has a system, built by Precept Automation, Inc. in Pittsburgh, that monitors each step in the process of attaching vinyl side moldings to its Taurus automobiles and issues a warning if temperature, pressure or location data are out of tolerance.

The Carnegie Group, Inc., also in Pittsburgh, has built a system for DEC that dispatches work for printed-wire board assembly, increasing throughput by 100%, according to Mark Fox, Carnegie Group's president and chief executive officer. Another system, currently being field tested, is capable of designing an electronic circuit from a behavioral specification, he says.

### Customizable systems

Whereas these systems belong to the company that paid for their development, another category of knowledge-based systems — one which is growing rapidly — is sold on the open market and becomes tailored to the company that buys it by the addition of company-specific information.

One of these commercial systems, the Operations Advisor from Palladian Software, Inc. in Cambridge, Mass., is designed to help the development of manufacturing strategies. A process engineer could, for example, use this system to predict how changes in the process flow would affect cost, lead times and work-in-progress inventories.

Another generic expert system is DSSCA Manufacturing System by Pittsburgh-based Decision Support Systems for Commercial Applications. The product analyzes production schedules to optimize the allocation of resources and looks for opportunities to salvage materials in the rework pile for use in filling incoming customer orders.

A typical process factory has between 5% and 10% of its inventory on the rework pile at any time. It often costs less to discard spoiled materials than to spend time performing the complex calculations that would uncover other uses for them. For a company that counts on a 10% return on investment and must scrap 10% of its raw materials, turning half of the rework pile into salable finished goods can have a dramatic effect on profits.

MSA Advanced Manufacturing, a division of Management Science America, Inc. in Atlanta, sells an expert system that acts as a front-end enhancement to its MRP II software. Inserting company-specific information into MSA's MRP II software, the expert system streamlines the coding process and produces an MRP II system customized for its owner.

A growing number of companies use expert system development software, often called shells, to build their own knowledge-based systems, either using in-house programming expertise or outside knowledge engineering expertise. Dozens of shells run on everything from the largest mainframes to personal computers. IBM, DEC and Cullinet Software, Inc. offer such products; so, too, do many software publishers and consulting companies.

Lee Hales, director of Coopers and Lybrand's Systecon consulting division, says that the use of AI technology should at least be considered by anyone planning for computer-integrated manufacturing [CIM]. "It's not axiomatic that every CIM plan needs an expert system," he says, "but somebody should look at it, evaluate tools and understand what other companies have achieved."

The question of whether AI technology can work in manufacturing is no longer an issue, Carnegie Group's Fox says. "We're past the point of proving the technology," he adds. "We're now at the point of finding whether people are smart enough to get involved with it."

MICKEY WILLIAMSON

# A little preparation takes risk out of MRP II

BY LARRY G. CURRY

If you surveyed the top managers of U.S. manufacturing companies today, most would probably voice some, if not all, of the following complaints:

- We can sell, but we can't ship.
- We've got cash-flow problems.
- We're getting a lot of calls from irate customers.
- We've got too much inventory.
- People don't properly execute top management's plans.
- We're not as competitive as we used to be.
- We're losing market share.

These are the difficulties manufacturers gripe about, but are they really the problems, or are they only the symptoms of a company lacking the control of an overall game plan? Probably the latter.

Most companies do not have a strategy that encourages all of their employees to march to the beat of the same drummer. As a result, they are seldom able to produce the right quantity of the right product at the right time.

Manufacturing resource planning (MRP II) has long been recognized as the tool that allows a company to generate the integrated company plan required to improve top management's control of the business.

## Misconceptions

Why, then, have so few companies chosen to take advantage of it? Possibly it is because of the misconceptions that MRP II is just another computer system or that it addresses only inventory issues. Or perhaps management is looking for a quick fix for all of their problems.

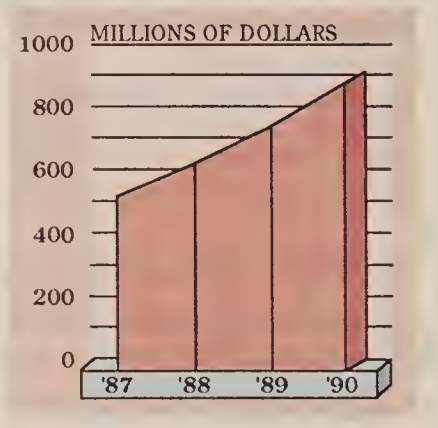
MRP II is none of the above. It is a people system that integrates the plans of marketing, finance, engineering and manufacturing into a unified company strategy. It is not a quick fix; the average implementation time lasts from 18 to 24 months. During that time, the implementation project must be given highest priority, second only to the product's shipment.

Fortunately, MRP II pioneers have helped chart a path to successful MRP II implementation. Following this path can help a company avoid the pitfalls most commonly encountered during implementation.

**First step: education.** As with any project, the first step — education — is one of the most critical. This includes offsite classes for the chief executive officer, his executive staff and the middle-management team. The purpose of this is twofold: It allows management to make an intelligent decision regarding the need for MRP II, and, by visibly involving upper management, it stresses the importance the company places on the undertaking. This second objective cannot be emphasized enough. The attitude of the people responsible for making MRP II work is a key element in a successful implementation.

**MRP II sales forecast**

*Worldwide sales potential for U.S. companies, 1987 to 1990*




INFORMATION PROVIDED BY HARBOR RESEARCH CORP.

**The project team.** Once the decision has been made to proceed, a project team must be selected. This team should be composed primarily of users and include a full-time project leader. The leader should be selected from inside the company, should be knowledgeable about the company's processes and products and have credibility with both top management and users. His No. 1 priority must be to provide direction to the project team and ensure that the project is always moving forward.

The executive steering committee, which is made up of the CEO and his staff, must review the project's progress to ensure that it stays on track.

**Software selection.** One of the most common mistakes made by companies that are implementing MRP II for the first time lies in the area of software selection. In his book, *The Right Choice — A Complete Guide To Evaluating, Selecting and Installing MRP II Software* (Oliver Wight Limited Publications, Inc., 1987), Christopher Gray says, "Never make a software decision until initial education is complete."

Members of the management team must understand MRP II and decide how they want the company to operate. They can then select the software package that best supports their needs. To make an uninformed software decision can severely limit a company's future options.

**Preparing for the pilot.** Concurrent with initial education and software selection, top management must begin production planning and establish written master production scheduling policies. In addition, steps must be taken to ensure data accuracy in the bill of materials and inventory records. The software must also be tested, and a pilot product selected. Once all of these pieces are in place, the pilot project can begin.

There are three possible approaches to converting to MRP II: parallel, cold turkey and the live pilot. The parallel approach has two major drawbacks. First, it requires a substantial drain on resources to operate both systems, and, second, it implies that the new output will be compared with the old to verify its validity. Since, in most cases, MRP II is being implemented because the output of the old system was inaccurate or inadequate, comparison of the two is probably not a valuable undertaking.

Tom Wallace, author of the book *MRP II: Making It Happen — The Implementor's Guide to Success with Manufacturing Resource Planning,* (Oliver Wight Limited Publications, Inc., 1985) says that when you go cold turkey, "You bet your company." It is similar to stepping off a cliff: Once you take the first step it's almost impossible to change your mind, and if the fall doesn't kill you, the sudden stop will. One high-tech company on the West Coast combined limited education with the cold turkey approach and stopped all output from the production areas for three days.

The recommended approach is the live pilot. This method provides maximum control with minimum risk. The pilot should be allowed to run until everyone involved is assured that the output is correct and is familiar with its operation.

As soon as the pilot is complete, conversion of the remaining products should begin. Products should be converted one or two at a time to maximize control and minimize risk. When all is operating smoothly, a similar approach should be used to bring the execution and financial systems on line.

MRP II allows people do their jobs better. It can work only if everyone involved is properly educated. Fifteen years ago, only about 20% of companies implementing MRP II were successful in their endeavor. Today, any company that approaches the process carefully and with skilled guidance should reap the full benefits of MRP II within two years. •

Curry is an American Production and Inventory Control Society-certified practitioner with 19 years of experience in manufacturing. He was involved with MRP II implementations at two Oregon companies and has been with The Oliver Wight Companies, an education and consulting firm, since 1984.

# Avoiding obstacles on the road to CIM

BY DAVID SHINKFIELD

As with all business changes, computer-integrated manufacturing (CIM) begins to pay for itself only when it is successfully implemented. There is some evidence, however, that a number of major companies that were early starters have been bogged down or have run into obstacles on the road to CIM.

All this means is that CIM implementation is complex and that achieving the planned benefits is a major challenge, not that CIM is unrealistic or unachievable. There are ways to minimize the potential problems inherent in automating and integrating the manufacturing process.

First and foremost, it is crucial to keep your objective in sight: the creation or improvement of your company's competitive advantage. Specifically, this means improving customer service, quality, response time and value for money. While developing and implementing your CIM facility, all decisions should be measured against this objective.

> COMPLEXITY poses the biggest threat. The simpler the application can be kept, the greater the probability of success.

Another priority is to develop a comprehensive strategy that will provide a focus for the many different disciplines — facility planners, product designers, sales engineers, customer service engineers, manufacturing engineers, system designers and human resource managers — that will be involved in making the integrated facility work.

In order for goals to be achieved, the new technologies must be matched to changes in management and the way the manufacturing process is organized. Management structure, roles, responsibilities, perhaps even attitudes, must be changed if the new information technology is not going to merely reaffirm old and perhaps irrelevant management practices.

Complexity poses the biggest threat to a company introducing CIM. The simpler the application can be kept, the greater the probability of success. If possible, therefore, it is best to streamline the process and the flow of materials before designing the CIM system. The reward for this exercise is that your objectives may be met with less automation but more management and control.

## Practice vs. perception

Hewlett-Packard Co. advises companies that wish to get into CIM to learn how their factories actually function as opposed to how they are supposed to function. One project in which our firm, PA Technology, was recently involved confirmed the wisdom of that advice. During the development of a new integrated facility at a Fortune 100 company that supplies the automotive industry, we noted a major difference between actual practice and management perceptions of practice in the area of chemical measurement methods. Convincing management that its assumptions regarding the operation of its factory were incorrect required a significant effort.

Costing out CIM can be complicated by accounting practices reflecting the traditional belief that hardware, not software, represents the major capital investment. A CIM introduction has a significant software component that can, in some instances, account for up to a third of the project costs. These costs must be an integral part of the budgeting and funding authorization process.

In simpler times, when equipment purchases were largely stand-alone machines, it was plant equipment that was purchased first, and software followed. A CIM installation consists of a variety of equipment, which can be supplied by a range of vendors. This equipment must be interconnected.

To minimize the complexity, again, it is best to start by preparing a system interface specification, defining how equipment will talk to the network and then including that standard in the equipment purchase order.

Where CIM has failed, the company has usually been in too much of a hurry to open the doors to the new technology. An incremental approach to achieving the strategy reduces the risks and any potential pitfalls.

Finally, the latest thinking on managing complex projects suggests attacking high-risk areas first. If you can crack the biggest problems up front, by comparison the rest will seem easy. •

Shinkfield is director of advanced manufacturing at PA Technology in Hightstown, N.J.

# Integration

FROM PAGE S3

"CIM is critical for our long-term success," says Richard Haslett, DEC's manufacturing CIM program manager. "It's a competitive issue for us."

Haslett says that DEC's manufacturing arm has used computers to manage the business almost since its inception, so the company followed "the classical CIM growth path by developing ever larger islands of automation," he says. Now the company has several major programs to bridge those islands and to reach out to the rest of the world.

One program focuses on shop floor integration; another links engineering to manufacturing; and a third is working on electronic data interchange with DEC's suppliers.

> "CIM is critical for our long-term success. It's a competitive issue for us."
>
> RICHARD HASLETT
> DIGITAL EQUIPMENT CORP.

"The engineering-to-manufacturing interface work is really on the cutting edge for our particular industry," Haslett says. "The quicker we can get products to market, the more competitive we're going to be."

The electronic data interchange program, which Haslett says is "still embryonic in terms of our relationships with specific vendors," has a just-in-time inventory management system as its goal. DEC has been working on just-in-time techniques long enough to be seeing measurable results. The company routinely plots published financial data for five vendors that it considers to be its major competitors. One of the factors measured is inventory turn (cost of goods sold divided by average inventory), a measure of the nonproductive portion of corporate assets.

"DEC had always defined the bottom end of the range," Haslett says. "But five years ago, we set out to improve our materials management performance." At the end of fiscal 1986, DEC led the group in inventory performance and expects to do so again this year.

"The first half of the journey, getting up to the average, just involved taking out a lot of the inefficiencies that had crept in, but surpassing the top end of the scale was the result of a very focused effort. Now we're setting the parameter for the top end, and it's still climbing," Haslett says.

To take those results to the bottom line, if nothing had changed, the company would have needed more than $2 billion in inventory to support its level of business in 1986. Instead, "we closed the books at about $1.4 billion, so we added $600 million to $700 million to the balance sheet," Haslett notes. "That number usually catches their attention."

### Longtime icons

The role models for this kind of success are still few in number — so few, in fact, that most industry experts name the same companies. First on almost everyone's list is Deere & Co. (formerly John Deere), maker of farm equipment. Deere's Waterloo, Iowa, Tractor Works was the first recipient of the Industry LEAD award given annually since 1981 by the Computer and Automated Systems Association of the Society of Manufacturing Engineers for "leadership and excellence in the application and development of computer-integrated manufacturing."

"A lot of people say Deere is losing money," says David Penning, head of the CIM unit at Dataquest, Inc., a San Jose, Calif.-based market research firm. "But the point is, they're in a market where everyone else has gone broke. The fact that they're still around is due to their willingness to invest and be pioneers."

A number of factors keep companies from implementing a CIM strategy. Penning lists 10 and says, "Put them all together, and it's like hitting a brick wall." Among these impediments are the following:

- **Lack of a manufacturing strategy.** A sense of direction is crucial to a CIM plan, yet many organizations are unable to articulate where they are going or how they intend to get there.
- **Inappropriate product design.** "You can't just take a product and say, 'OK, now we'll produce this by automation,' " Penning says. "You have to design it to be produced by automatic equipment."
- **Lack of standards, especially for communication.** "IBM doesn't talk to DEC doesn't talk to HP doesn't talk to Tektronix and so forth. It's a mess," Penning says, noting, "We're beginning now to get some standards." The manufacturing automation protocol project spearheaded by General Motors Corp. is one notable effort.
- **Technically weak top management.** Management today tends to come from administrative departments such as accounting or marketing, with no experience in the technology of manufacturing or design, Penning says, and is therefore unable to cope with the complexities of CIM.
- **Inappropriate measures being used for return on investment.** "The assumption

*Continued on page S6*

# VENDOR VIEWPOINT
# Pick Systems: A step beyond the obvious

BY JOHN BLUMBERG

It has long been a given that manufacturing systems require a data base management system at their heart. This becomes increasingly true as the drive toward computer-integrated manufacturing (CIM) accelerates.

Today, the relational model is being espoused by most manufacturers and software developers. There also seems to be general agreement in the manufacturing community that, while it does not solve all of a manufacturer's integration problems, the relational model does offer the best opportunity of achieving CIM.

What is unfortunate is that one of the most effective realizations of this model is one that is little known or recognized. Ask any MIS manager or consultant where to go for a relational data base system, and his answer will be IBM, Cullinet Software, Inc., Oracle Corp., Software AG of North America, Inc., Applied Data Research, Inc. and Cincom Systems, Inc.

Or, if the manager has a particular hardware bias, the response will probably be divided among IBM, Hewlett-Packard Co., Digital Equipment Corp., Wang Laboratories, Inc. or another major player. The answer that will almost never come back is Pick Systems.

> PICK can be used in a business environment without the high-priced MIS talent normally associated with a DBMS.

The Pick system was created in the late 1960s by Don Nelson and Dick Pick and became commercially available in 1974. In the first decade of its existence, Pick was viewed strictly as an operating system, and, in fact, it does provide all the features found in operating systems released in the 1980s.

Its most important feature for the manufacturer, however, is a natural, English-like human-engineered interface to a relational data base. Pick's relational data base predates the published works of Edward Codd and Chris Date, pioneers in the field of the relational model.

### Flexible from the start

Consultants and analysts point out three major advantages in the relational model: easy user interaction, programmer productivity and flexibility. These were the driving forces behind the development of precursors to the Pick system at TRW, Inc. in 1965.

While a certain number of organizational, managerial and planning problems have to be expected in any data base implementation, the Pick system reduces these to a minimum. Pick can be used in a business environment without the high-priced MIS talent that is normally associated with a DBMS. There are more than 60,000 Pick systems installed worldwide, and most of them are run without the benefit of an MIS department.

> THERE are more than 60,000 Pick systems installed worldwide, most of which run without the benefit of an MIS department.

An employee with minimal training can input and extract the information he needs from the system. Pick allows a user to direct the machine to deliver information with English-like commands. The operator asks the computer to LIST or SORT information from a relational table, states the desired selection conditions and lists the data by the desired name. These commands can be predefined, and the user can receive on-screen prompts for selection criteria.

Pick's data fields are defined in data dictionaries and given meaningful business names. The data base supports calculated fields, virtual fields, copied fields, numbers, dates, time of day, characters, text and edited fields. The user does not care about description details — all he needs to know are the data names.

Programming is accomplished through an extended version of Basic. Extensions include string manipulation, structured programming syntax, screen manipulation, subroutine support and output formatting. Programmers working with Pick Basic report it is more like Pascal than Basic.

The great strength of Pick Basic is that it is tightly coupled with the relational data base. A robust array of I/O verbs are provided to efficiently manipulate the data structures. The terminal commands can be used within the programs, providing a built-in report generator capability.

Flexibility is both the hallmark and key attraction of the relational DBMS, and Pick is extremely flexible. Pick data structures can be changed even when populated with information. When the U.S. Postal Service came up with Zip Plus Four, for example, data bases across the country shuddered, but not Pick. A data dictionary change from five to nine digits was all that was needed.

Data items such as date and time are not always handled well by a DBMS, yet these types of data are critical to a manufacturing data base. Pick, on the other hand, has always addressed these data items as special types by offering the user the functionality of a data dictionary to control data entry, display and manipulation.

Adding new data fields, new relational tables and new applications is easy with the Pick DBMS. The data dictionary is active, and there is no data base generation or binding process. Applications, fields and tables can be added to a running system without disturbing the production cycle. Of course, recompilation of programs and data entry are necessary to use the new information.

### An unchanging nature

Performance becomes an especially critical issue when the data base adheres to the relational model.

The relational model does not define an implementation, and most relational DBMSs are layered on existing general-purpose file structures, which means little or no optimization can take place. This condition is caused by independent software suppliers implementing their DBMS on someone else's hardware design. With some exceptions, users of those products have no portability and, in some cases, are without upgrade paths.

Pick implementations follow generic specifications, however, so users on any machine view the system as Pick-based. Each of these Pick implementations is

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Blumberg is director of marketing at Northeast Data Systems, Inc., a Burlington, Mass.-based CIM vendor for the electronics, metal fabrication and food-processing industries.

# Integration

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that if we do nothing, it costs nothing is the worst mistake," Penning warns.

**• Rapid changes in technology and the let's-wait-for-the-next-breakthrough syndrome.**

Organizations that overcome these difficulties can choose from a number of entries with which to integrate their operations. Some start with a computer-aided design and manufacturing system, some with a manufacturing resource planning (MRP II) system and some by linking existing islands of automation on the factory floor. Few believe that they have the option of taking what industry observers call "the green-field approach" of building a fully automated company from the ground up.

**SOME START WITH a computer-aided design and manufacturing system, some with a manufacturing resource planning system and some by linking existing islands of automation on the factory floor.**

Which approach makes most sense is usually a function of the kind of manufacturing enterprise in question and the systems the organization has in place.

Orr stresses the need to start with as few assumptions as possible. "Everybody is saying that the green-field theory of CIM is too expensive, and the current thought about how to deal with islands of automation is that you build bridges. But it may be better to drain the ocean and get to work with bulldozers — in a sense to start over with existing resources, reallocating and being willing not to have any sacred cows," he says.

Turf warfare is almost inevitable, and a strong management commitment is required to keep internal politics from driving the CIM plan.

Systecon's Hales describes a typical situation: "Let's say a company's real problem in terms of shipment cycle is that it has a hopeless order entry system in the customer service department. They could take days out of the cycle by cleaning up the front-end paperwork processes in order entry.

"Meanwhile," he continues, "the materials manager is operating a 10-year-old homegrown MRP system that's dated and expensive to maintain. The CIM plan may acknowledge that the MRP system should be replaced, but the order entry system is far more important, so the company will work on that for 24 to 36 months and get to MRP later. That's a pretty tough pill to swallow if you're the materials manager."

In many companies, Hales says, "the person who is the most eloquent or has the ear of the funding executive is going to get the nod. In a CIM plan, each functional manager will have realized his place in the scheme of things, and you'll actually be funding, each year, that year's chunk of a long-term strategic program. That's quite different from the way we go about it today."

Contrary to the predictions of those in information resource management, CIM system design is not likely to fall under the control of the information systems department, according to Hales. "DP professionals tell us they don't want to drive it," he says, "that it should be driven by folks from manufacturing or marketing or by top management directly."

However, he adds, the MIS department's contributions are vital to the success of the effort. If ill will has developed between manufacturing and MIS, Hales warns, "that has got to be stopped up front. We've got to get back to playing together as a team."

### Details and direction

Politics aside, the major pitfall in implementing a CIM plan seems to be a tendency to get involved in the details of architecture before the overall strategic direction has been set. "People cover the walls of the conference room with flow diagrams, and yet they still don't have a vision of what they want to integrate," Hales says.

After a period of lethargy, a growing interest in CIM is starting to reflect itself in the marketplace. Dataquest's Penning says the U.S. market for CIM products has been flat at $17 billion for the past couple of years. He expects it to reach $28 billion by 1991, still only about 3.6% of overall capital expenditures in manufacturing.

Penning says the new interest in CIM stems from a recognition that manufacturers "must use computers and new organizational strategies. That message has gotten through," he says. "The questions now are how and what is the best way."

Deciding to integrate may be a "bet your business" decision, Penning says, but "deciding not to is to bet on going out of business."

"There's an opportunity here as well as a threat," he continues. "How else are we going to create the wealth to give us the standard of living that we've become accustomed to? What else are we going to do: sell each other insurance and sue each other? Where's the wealth? It's got to come from agriculture and manufacturing," he says. •


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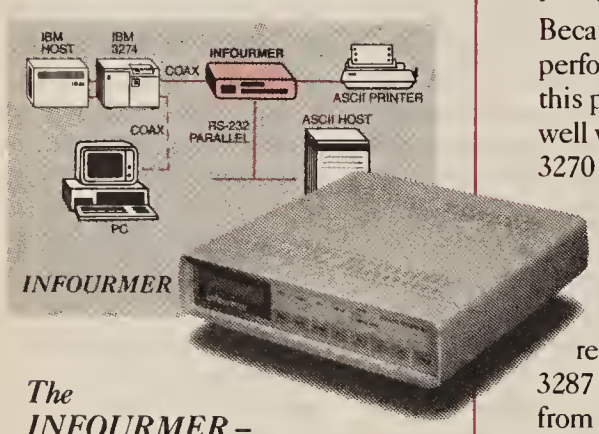


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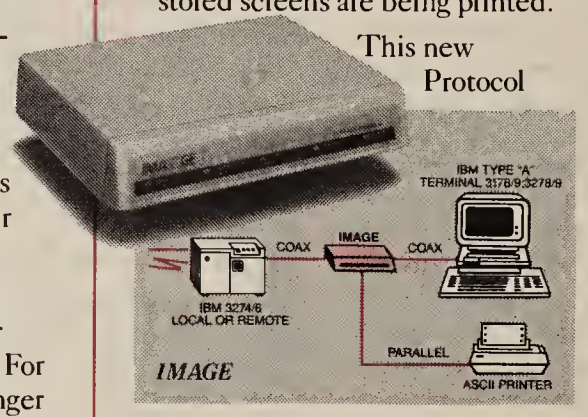


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# Human systems demand equal time in CIM effort

BY STEPHEN STULCK

The transition to a computer-integrated manufacturing (CIM) environment poses challenges to virtually all elements of traditional organizational life. Implementing CIM calls for deliberate and planned change that recognizes the way the three major subsystems of a product-producing organization — the manufacturing system, the information system and the human system — overlap and interact.

It is in the intersection of these three domains that change is most pronounced. Most organizations are able to address each area independently but struggle when it comes to addressing them in an integrated manner.

Many organizations, although receptive to innovation in technology, resist innovation in the social or organizational domain. Compounding that irony is the fact that most of the recalcitrants are aware, at least on an intellectual level, that when technically innovative projects fail, it is generally not because of technical problems but because people issues go unaddressed.

A critical first step in managing the changes that accompany the introduction of advanced manufacturing technology is to identify those human issues, many of which involve more than manufacturing and require attention from the entire corporate management.

### Structural changes

When a manufacturing organization moves ahead into an advanced automation mode, functional groups within the production facility tend to report directly to the plant manager, since the need for rapid detection and correction of errors mandates a short line of communications.

Reducing the managerial hierarchy in this way encourages managers to assume increased responsibility and adopt a more participative management style. Often, no more than three or four levels of management exist within a plant from the shop floor to the plant manager. The employees who feel the greatest impact from this hierarchical change are the lower- and middle-level managers, who are asked to assume a much broader span of control.

Reducing the managerial hierarchy can also result in a drastic reduction of job classifications. With fewer classifications, jobs become less defined, and employees must develop diverse skills that cross traditional functional or operational boundaries. A single job might, for instance, include aspects of production, materials, maintenance, quality control, personnel and housekeeping.

This blurring of functional responsibilities is not limited to the shop floor. Management and technical support staff must also cope with a greater degree of ambiguity. For example, the distinctions between quality-assurance engineering and process engineering or between product and manufacturing engineering is increasingly difficult to describe.

As a result, there is a trend in advanced manufacturing environments toward the development of work teams having the skill and authority to identify and fix problems they experience in the production process. Since it is difficult for one person to understand the entire operation, the use of a team allows information to be pooled.

> POWER and conflict, as central features of organizational life, are affected deeply, if not always openly, by the introduction of CIM.

Compensation systems often need to be modified to reflect and support changes in the organizational structure. Most notably, pay-for-learning systems are being developed to foster individual commitment to learning and to encourage employees to take on broad responsibilities for the operation and maintenance of the plant. These plans reward individuals with money, based on demonstrated competence in a wider range of skills and tasks. Group compensation programs reward employees at the corporate, plant or group level for improved performance.

### Political changes

Power and conflict, as central features of organizational life, are affected deeply, if not always openly, by the introduction of CIM. Shifts in the distribution of power within the organization change how decisions are made and rearrange the informal pecking order within groups.

One observable change is the increased importance of employees who are knowledgeable in information systems — from corporate systems to the shop floor device controls. Such knowledge is critical and provides those who possess it with a legitimate seat at the table in the planning process.

Knowledge is often splintered among various groups, however, such as the corporate MIS function, the advanced engineering group and the plant manufacturing engineering function. Focusing this knowledge often requires great powers of conciliation on the part of the project manager.

Human resource managers also gain influence in effective CIM implementations. The need to closely align human resource policies and practices with the new operating practices in plants requires innovative and creative solutions.

The introduction of CIM makes new claims on scarce resources, and it is not unusual for coalitions to form and lobby for their own interests. Tensions also develop over who will control a specific project. Manufacturing engineering, manufacturing information systems and manufacturing operations, among others, all have claims to leadership of the project. Creating a unifying set of corporate objectives becomes critical when traditional turf struggles escalate.

In many cases, the organization is designed outward, from core production tasks to the various support activities, creating an organizational chart that resembles a jelly roll. The goal is to invest production teams with ultimate control over the resources needed for ongoing production. Support teams, on the other hand, deal with technical innovations and maintain liaisons with the wider corporate and vendor community.

This type of power division runs contrary to the traditional decision-making matrix within a plant and often disrupts already established corporate reporting relationships.

Plant managers, while given greater autonomy within the plant, are more dependent on product design groups, equipment engineering and marketing and must therefore learn to interact with them in a collaborative manner.

At the same time, the supervisor is asked to become an effective boundary manager and coach, ensuring that a work group has the information, skills and resources it needs to solve problems effectively.

### Human resource changes

People need to be committed to organizational goals instead of feeling compelled merely to comply with specified behaviors. A paradox of CIM is that while a company's automation increases, its manufacturing process becomes increasingly dependent on sound judgment, effective decision making and accurate responses to unpredictable problems.

An investment in training is necessary to enhance technical and interpersonal skills. Training often begins long before plant start-up and tends to be formal, requiring designated trainers, course development and certification standards. In addition, it is not unusual to periodically require employees to be recertified in certain critical skills.

Although education on this scale can be expensive, the cost of shutting down the production operation in a highly integrated plant would far outweigh the cost of prevention.

In a CIM operation, problem solving is a responsibility that belongs to everyone in the plant, and there should be an effort to foster an environment in which information is readily available and in which problems surface early. This is happening in many places, and the term "employee information system" is starting to crop up with some frequency as a replacement for "management information system."

An even more significant redefinition resulting from CIM comes in the accounting status of human resources investments. Instead of regarding labor as a variable cost, companies often begin to treat it as a fixed cost of production, which has tremendous implications for the organization's relationship to its human resources.

### Symbolic changes

The introduction of CIM is not a purely rational act. The organizational environment is ambiguous, contradictory and often confusing to those who work within it. To derive sense and order out of specific events or decisions, we use myths and rituals to help explain them.

Two major symbolic themes that arise in implementing CIM deal with the cultural values that encourage democratic participation and management by principle instead of by procedure.

As previously mentioned, expertise and knowledge become the prime determinants of authority in the organization, and control shifts according to who can contribute to the resolution of a given problem at a given time.

Business objectives are frequently discussed widely and in explicit terms on the assumption that when employees have a central role in creating the organization, they tend to feel more commitment to the organization. This theory appears to be valid for the first generation of employees in the plants. Whether it holds true over time is a subject for research.

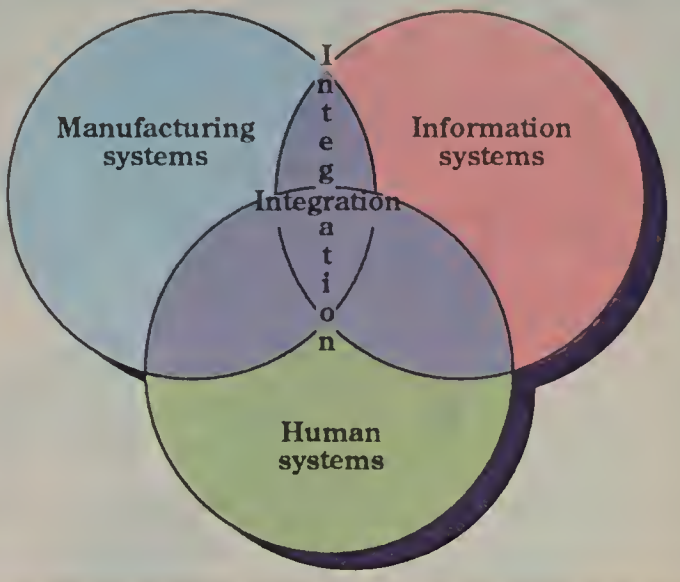
The implementation of CIM requires managers to suspend their business-as-usual perspective. Technical innovation and social innovation are inextricably interconnected. Social innovation requires the same degree of attention, knowledge and experimentation as any technical system.

We need to learn how to create organizations capable of using the promise of computer-integrated manufacturing to its best advantage. To do that, we need to have organizations that mirror the characteristics of CIM technology: agility, adaptiveness, robustness and efficiency. •

Stulck is director of human systems development at ITP Boston, Inc., a systems integrator for computer-integrated manufacturing.

## Key components of CIM

*Areas of intersection and maximum change*

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# Pick Systems

CONTINUED FROM PAGE S5

hardware-dependent and optimized for the specific target machine. There are three methods used to put Pick on a computer: the dedicated approach, coexistence and data base machine.

In the dedicated approach, the machine is engineered to run the Pick operating system as the native control system. Since hardware, firmware, utilities and mass storage are all set up specifically for Pick, performance is optimized.

Using the coexistence approach, Pick is implemented as a data base environment within Unix or Prime Computer, Inc.'s Primos. Performance is maintained by special CPU firmware and a formatting of mass storage devices to hold data in the Pick format. This technique is used by Prime with Prime's Information data base.

**FAULT-TOLERANT nonstop processing is a requirement for many manufacturing environments, and Pick is currently one of the few relational DBMSs that are implemented on redundant hardware systems.**

An array of machines — from vendors as diverse as NCR Corp., NEC Corp., Apollo Computer, Inc. and AT&T, to name a few — offer support for both Pick and Unix. Although the two operating environments might be expected to be fierce competitors, they actually complement each other. Unix is becoming a major factor as an operating system, and Pick adds a relational data base that supports many manufacturing and general business applications.

Fault-tolerant nonstop processing is a requirement for many manufacturing environments, and Pick is currently one of the few relational DBMSs that are implemented on redundant hardware systems. Nonstop communication front-end processors are available for some minicomputer and mainframe machines that support the well-known relational systems. Sequoia Systems, Inc. has announced fault-tolerant Pick, Parallel Computers, Inc. is expected to announce a related product shortly, and other fault-tolerant vendors are certain to follow with Pick and Unix functionality in the near future.

The data base machine approach is used by Ultimate Corp. to implement Pick on Honeywell Bull, Inc. and DEC machines. The host processor is augmented by special-purpose processors that execute the Pick data base programs. This leaves the host CPU free to run other tasks, such as native-mode programs, and to manage data traffic.

Ultimate also supplies the Pick system for the IBM 370 architecture machines — the 4300 and 9370 processor series — and larger mainframes. In this implementation, Pick runs as a machine under VM, which results in an interesting combination of all three methods.

From the beginning, Pick was to be a small-system solution. The objective was to provide the user community with low-cost, easy-to-use, people-oriented solutions. This meant 8- and 16-bit processors that could support few terminals, limited memories and limited mass storage.

That may have been, but it's not the way it is now. Pick is available on systems that are small in size, but there is no lack of power. Thanks to Motorola, Inc.'s 68000 and Intel Corp.'s 80386 chips, Pick processors are available in small packages that will realistically support more than 1,000 users.

In manufacturing and in CIM, integration is everything. Distributed processing is seen by many in the manufacturing world as a necessary strategy for achieving fully integrated systems. Pick is no stranger to that sphere.

Since early 1985, the Pick system has been available on a wide variety of Intel 8086- and 80286-based desktops from more than 20 vendors. More than 10,000 users adopted Pick on their desktops in 1985 and 1986. This makes the Pick system a viable choice for individual companies that follow the clustered personal computer philosophy of distributed data processing.

For organizations that see the plant-level controller systems approach as the way to implement distributed data processing, Pick systems are also a solution. Prime, for example, supports networked links between desktops executing Pick programs and superminis that act as file servers for the Information data base. This approach distributes the computing load to desktops and preserves the integrity of the relational data base.

Desktops running Pick are effective in off-loading host machines in the development process. Programming, system modeling and system testing can take place on PCs, and the finished software can then be moved to the host for production. This conserves valuable ports and machine cycles needed to support the manufacturing business process.

Although few MIS professionals, industry consultants or data base gurus will mention Pick in a relational data base discussion, Pick is a real entity whose existence has been overlooked for much too long. •

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# MRP II software

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Advanced Manufacturing Software, Inc. (602) 829-7822** | PMC | Assembly and machines companies with 20 to 100 employees | 17 | Purchasing, engineering, manufacturing, material allocation/capacity planning, rough-cut capacity planning/MRP[1], accounting | IBM AT, XT and compatibles, AT&T 3B series, NCR Tower, Unisys 5000/50, Convergent Mighty Frame, DEC VAX/VMS, Compupro, Plexus, Stride 440 | All | Regeneration | Yes | No | Yes | Yes | Yes | Yes | 7 | $1,000-$5,000 |
| **All Type Software, Inc. (216) 243-2380** | Mancos | Electronics, car component manufacturers | 12 | Master scheduling, shop floor control, inventory control, sales order processing, purchase order processing, capacity planning | Data General MV line | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | None | Contact vendor |
| **American Business Computer, Inc. (313) 855-4520** | ABC Manufacturing Management | Repetitive manufacturers | 4 subsystems | MRP, inventory control, production planning, bill of materials, vendor communications, distribution | AT&T Unix System V, Microsoft Xenix SCO, MS-DOS | Most | Regeneration | Yes | No | Yes | Yes | No | No | 30 | $2,000-$20,000 |
| **American Software, Inc. (404) 261-4381** | MRP-8 | IBM mainframe users | 11 | MRP/MPS[2], bill of materials, route and work center, production order status, capacity planning, product costing | Any IBM mainframe | Most | Both | Yes | Yes | Yes | Yes | Yes | No | 70 | Contact vendor |
| **Applied Information Development, Inc. (312) 574-3030** | Aid-Manufacturing Control System | Medium- to large-size manufacturers and distributors | 4 | MRP, MPS, CRP[3], distribution requirements planning | Any IBM mainframe | None | Both | Yes | No | No | No | No | No | 12 | $30,000-$75,000 |
| **Arthur Andersen & Co. (312) 507-6695** | Mac-Pac/Just-in-Time | Commercial manufacturers | 12 | Just-in-Time planning, Kanban, design engineering, manufacturing engineering, inventory control, master scheduling | IBM 360, 370, 3080, 3090, 4300 series | All | Both | No | Yes | No | Yes | Yes | Yes | 110 | Contact vendor |
| | Mac-Pac/D | Defense industry | 14 | Design engineering, inventory control, shop floor control, contract materials planning, material engineering, contract accounting | IBM 360, 370, 3080, 3090, 4300 series | All | Both | Yes | Yes | No | Yes | Yes | No | 25 | Contact vendor |
| **Ask Computer Systems, Inc. (415) 969-4442** | Manman Information System | Manufacturers with $5 million to $30 million in sales revenue | 19 | Manufacturing, order management/accounts receivable, general ledger, fixed assets, accounts payable, quality management | HP 3000 series, DEC VAX | All | Regeneration | No | Yes | Yes | Yes | No | No | 1,000 | $80,000-$400,000 |
| **Axis Computer Systems, Inc. (617) 481-9600** | Ax/IOM | Made-to-order companies with $10 million to $250 million in sales | 19 | MPS/MRP, product configuration/final assembly scheduler, customer order processing/customer service, shop floor control/CRP, bill of materials, purchasing/receiving | Unisys 5050, 5070, 5090 | All | Both | No | Yes | Yes | Yes | Yes | Yes | 30 | $44,000 (for 8 users) |
| **Boeing Computer Services (800) 551-0800** | Production Management System | Aerospace, defense manufacturers | 14 | MRP/CRP, shop floor control, product structure, inventory control, purchasing/receiving, financing | IBM 4300 series and above, HP 3000 | All | Both | No | Yes | Yes | Yes | No | Yes | 50 | $89,000-$400,000 (total system cost) |
| **Bluebird Systems, Inc. (619) 438-2220** | Plant Manager | Small- to medium-sizemanufacturers | 13 | MRP with master scheduling, sales/purchase order processing, job costing, general accounting, bill of materials, inventory control | IBM AT | Most | Regeneration | No | No | Yes | No | No | No | 50 | Contact vendor |
| **CSC Compufact, Inc. (714) 891-6336** | Man-Fact II | Mid-size discrete manufacturers | 15 | Accounts payable/receivable, cost accounting, marketing/sales, production control/shop floor control, production/inventory management, production planning | Prime 50 series | All | Net change | Yes | Yes | Yes | Yes | Yes | Yes | 80 | Contact vendor |
| **Caelus Associates, Inc. (509) 455-8566** | Management System | Manufacturers with $5 million+ in sales | 22 | Production planning (MPS, MRP, CRP), sales order entry and management, purchase order management, bill of materials processor, inventory control with lot and serial number tracking, shop floor control with automated data collection | Wang VS | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 90 | $10,000-$175,000 (total system cost) |
| **Cincom Systems, Inc. (513) 662-2300** | Control: Manufacturing | Fortune 1,000 companies | 14 | Full closed-loop manufacturing, financial, lot/serial traceability, project manufacturing control, repetitive manufacturing control | IBM 3080, 3090, 4300 series, 9370, DEC VAX/VMS | All | Net change | Yes | Yes | Yes | Yes | Yes | Yes | 100+ | $100,000-$500,000 (total system cost) |
| **Compusource Corp. (714) 879-8800** | Dynamic | Manufacturers with $2 million to $50 million+ in sales | 18 | MRP, accounting, distribution, work order processing, capacity planning, scheduling | Data General MV 2000 to 20,000 series, IBM PC AT | Most | Both | Yes | Yes | Yes | Yes | No | Yes | 100 | Contact vendor |
| **Computer Covenant Corp. (203) 677-6563** | Integrated Manufacturing System | Custom-build manufacturers | 9 | MRP, order entry, bill of materials, job costing, production planning, tool inventory | IBM PC and compatibles on PC-DOS, Novell Netware, Xenix, DEC PDP-11, DEC VAX | All | Net Change | No | Yes | Yes | No | No | No | 100 | $2,000 |

[1]Manufacturing resource planning [2]Master production scheduling [3]Capacity requirement planning

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors. Research assistance was provided by The Oliver Wight Companies.

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Computer Strategies, Inc. (616) 957-4444** | Repetitive Manufacturing System | Repetitive manufacturers | 6 | Financial control system, quotation management system, level load production planning, repetitive purchasing system, release control system, demand-demand modeling and forecasting system | DEC VAX, Honeywell DPS-6, IBM 9370 | Most | Net change | Yes | Yes | Yes | Yes | Yes | Yes | 75 | $50,000-$250,000 |
| **Computer Systems Development, Inc. (617) 460-0330** | Impcon | All manufacturers | 11 | MRP, component data and inventory management, purchase management, bill of materials, work order management, manufacturing/cost control | DEC VAX, PDP-11 | Most | Regeneration | Yes | Yes | Yes | Yes | Yes | No | 20 | $5,000 (average) |
| **Computer Technology, Inc. (206) 455-1700** | MCS II | Manufacturers with $3 million+ in sales | 7 | MRP, inventory, purchasing, bill of materials, shop floor control, labor productivity | Wang VS | All | Both | No | Yes | Yes | Yes | Yes | Yes | 70+ | $3,000-$7,000 |
| **Cullinet Software, Inc. (617) 329-7700** | Manufacturing System | Manufacturers, government contracting companies | 12 | MRP/MPS, order entry/purchasing, inventory control, shop floor control, bill of materials, costing | IBM 4300 series, 3080, 3090, 3030,370, 9370, 9390, all IBM-compatible mainframes | Most | Both | Yes | No | Yes | Yes | Yes | Yes | — | $70,000 (approximate) |
| **DBSI Information Systems, Inc. (714) 837-3744** | SMC | Manufacturers with $3 million to $50 million in sales | 11 | Purchasing, materials planning, general ledger, order processing, accounts payable, production control | DEC VAX series, TI 990, AT&T Unix System V | All | Both | No | Yes | Yes | Yes | No | No | 100 | Contact vendor |
| **Data Systems for Industry Corp. (213) 493-4541** | QED | All manufacturers | 18 | Inventory control, bill of materials, purchasing, work order, net resource planning, receiving inspection | HP 3000, Stratus 32, IBM System/38 | All | Both | No | No | Yes | Yes | No | No | 50 | $6,000-$24,000 |
| **Data 3 Systems, Inc. (707) 528-6560** | Manufacturing Resource Planning System 36-S | Small manufacturers | 12 | MRP, MPS, business planning, order entry, inventory control, purchase order management | IBM System/36 | All | Regeneration | No | No | No | Yes | No | NA | 100 | Contact vendor |
| | MRPS 38-S | All manufacturers | 12 | MRP, MPS, business planning, general ledger, accounts payable/receivable, payroll | IBM System/38 | All | Regeneration | No | No | Yes | Yes | No | No | 100 | Contact vendor |
| | MRPS 38-P | Process manufacturers | 12 | MRP, MPS, business planning, general ledger, accounts payable/receivable, payroll | IBM System/38 | All | Regeneration | No | No | Yes | Yes | No | No | 100 | Contact vendor |
| **Diversified Data Systems, Inc. (602) 792-3250** | Summit-Keystone | Manufacturers with $50 million+ in sales | 76 | MRP, inventory control, forecasting, shop floor control scheduling, vendor analysis, job tracking | Wang VS, DEC VAX, Concurrent 3200 series | All | Both | No | Yes | Optional | Yes | Yes | Optional | 10 | $2,000-$30,000 |
| **Driver-Harris Systems, Inc. 201-641-8660** | Suzy Manufacturing Resource Planning | Manufacturers with less than $50 million in sales, divisions in large companies, FDA-regulated companies | 16 | MRP, inventory control, lot control/traceability, bill of materials, customer orders/manufacturing orders, shop floor control | IBM PC and compatibles | All | Both | Yes | Yes | Yes | Yes | No | Yes | 70+ | $5,000-$15,000 |
| **Escom, Inc. (206) 828-0995** | Manufacturing Management and Control | General, discrete manufacturers | 9 | MPS, standard costing, inventory planning, shop floor control, purchase order processing, sales order processing | All hardware supporting Pick operating systems, Prime 50 series superminicomputers | All | Net change | Yes | No | Yes | Yes | Yes | Yes | 200 | $1,000-$10,000 |
| **Formation, Inc. (609) 234-5020** | Forman | Discrete manufacturers | 12 | Integrated MRP/CRP, MPS/forecasting, inventory control, shop floor control, receiving/purchasing, simulation | IBM 370, 4300 series, 3080, 3090, 9370 series | All | NA | Yes | No | No | Yes | No | No | 6 | Contact vendor |
| **Fourth Shift Corp. (800) 342-5675** | Manufacturing Software series | All manufacturers | 20 | MRP, inventory control, bill of materials, general ledger, order entry, accounts payable/receivable | IBM PC and compatibles | All | Both | No | Yes | Yes | Yes | Yes | Yes | — | $295-$4,995 |
| **Herbert Friedman & Associates, Inc. (312) 948-7180** | HFA | Manufacturers with $25 million to $150 million in sales | 20 | Customer order processing, manufacturing reporting and control, accounts payable, engineering records, purchasing, general ledger | IBM System/38 | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 75 | $4,000-$40,000 |
| **Genesis Resource Management, Inc. (617) 339-5503** | Genesis | All manufacturers | 9 | MRP, purchasing, order processing, inventory management, bill of materials/cost/routing, general ledger | IBM System/38 | Most | Both | No | Yes | Yes | Yes | Yes | No | 70 | $10,000-$35,000 |
| **Gnosis, Inc. (215) 684-1010** | The Bottom Line | All manufacturers | 12 | Inventory, job costing, scheduling, bill of materials, labor productivity, invoicing | Unisys B20 | All | Net change | No | Yes | No | No | No | No | 50 | Contact vendor |
| **Heuristima Corp. (206) 248-2661** | Bytims | Made-to-order job shop manufacturers | 10 | MRP, production scheduling/capacity planning, cost accounting, purchasing, inventory control, bar code factory data collection | All Prime hardware | All | Regeneration | No | Yes | Yes | Yes | Yes | No | 20 | $10,000 (average) |
| **Hewlett-Packard Co. Contact local HP office** | MMII | Medium- to-large-size, discrete and discrete process manufacturers | 8 | MRP/shop floor control, purchasing, sales order management, product costing, financials, Just-in-Time | HP 3000 | All | — | No | No | Yes | Yes | Yes | Proprietary | 600 | $18,000-$36,000 |

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Honeywell Bull, Inc. (602) 862-3771** | Manufacturing System | Medium- to-large-size discrete manufacturers | 8 | MRP, MPS, inventory management, manufacturing, data control, job floor control, purchasing | Honeywell DPS 7000, DPS 8, DPS 8890 | All | Net change | Yes | No | Yes | Yes | No | Yes | — | $8,000-$30,000 |
| | Distributed Manufacturing System | Small- to medium-size manufacturers | 5 | MRP, inventory record management, shop floor control, order processing, financial packages | Honeywell DPS 6, 6+ | All | Net change | Yes | No | Yes | Yes | No | No | — | $7,000-$17,000 |
| **IBM Contact local IBM office** | Manufacturing Accounting and Production Control System (MAPICS) I and II | Small- to large size manufacturers | 19 | MRP, inventory management, product data management, MPS, CRP | All IBM System/36, 38 models | All | Both | No | No | Yes | Yes | No | Yes | — | Approx. $5,500 |
| | Communications Oriented Production Information Control System (COPICS) | All manufacturers | 25 | MRP, customer order servicing, MPS, CRP, purchasing/receiving, plant monitoring and control | IBM 370, 4300 series, 3090, 9370 series | Most | Both | No | No | No | Yes | No | No | — | Contact vendor |
| **Imerex Computer Systems, Inc. (800) 874-1020** | Pro-MS | Warehousers, distributors, manufacturers | 6 | MRP/MPS, inventory control/bill of materials, capacity planning, shop floor control, costing, labor management | IBM System/36, 38 | Most | Regeneration | Yes | Yes | No | Yes | Yes | Yes | — | Contact vendor |
| **Infisy Systems, Inc. (713) 820-5954** | Shop Floor Control System | Custom job shops and manufacturers | 15 | Estimating/routing, production planning, cost accounting, performance measurement, inventory control, bill of materials | All Data General hardware, all AT&T hardware, IBM AT and compatibles | Some | — | Yes | Yes | Yes | Yes | No | No | 250+ | Contact vendor |
| **Infosource Management, Inc. (919) 828-0049** | Job Manufacturing and Accounting Control System | Sheet-metal fabricators, custom manufacturers | 6 | Customer order processing, purchasing, inventory/bill of materials, plant reporting, job costing, system administration | IBM ATs, any Microsoft MS-DOS-compatible system, Wang VS | All | Net change | Yes | Yes | No | No | Yes | No | 4 | $4,000-$18,500 (total system cost) |
| **Integral Computer Systems, Inc. (203) 928-0451** | Computer-Integrated Manufacturing Resource Planning | Manufacturers with $1 million to $50 million in sales | 20 | Forecasting/requirements planning, job shop scheduling, bill of materials, costing, order entry, inventory management | IBM PC stand-alone and LANS, Unisys Unix, IBM System/36 | All | Net change | No | Yes | Yes | No | Yes | Yes | 5 | $1,000-$3,000 |
| **Interactive, Inc. (619) 560-8525** | Manufacturers Infoflo | General manufacturers | 15 | MRP, MPS, capacity planning, production costing, field service management, financial accounting | All Ultimate hardware, DEC VAX, Microvax, all Prime hardware, IBM 4300 series, 360, 370, 9370 | Most | Both | No | No | Yes | Yes | Yes | Yes | 2,000 | $4,000 (average) |
| **Interactive Applications, Inc. (408) 727-8161** | Manufacturing Core System | Small- to medium-size manufacturers | 9 | MRP, bill of materials, inventory control, purchasing, shop floor control, cost accounting | Unisys A series, XE 550 supermicro | All | Regeneration | No | No | No | Yes | No | Yes | 0 | $15,000 (total system cost) |
| **Interactive Information Systems, Inc. (602) 790-4214** | IMCS | Manufacturers with up to $20 million in sales | 9 | Master schedule/MRP, order entry, configuration, inventory, bill of materials, shop floor control | DEC VAX 8200, 8300, IBM 9370, 4300 series, Sequent SB 8, SB 21, IBM PC and compatibles | Most | Both | Yes | Yes | Yes | Yes | Yes | Yes | 100 | From $5,000 |
| **Intrologic, Inc. (800) 521-5639, (313) 557-7120 (in Mich.)** | Manufacturing III | All manufacturers | 7 | Materials control, order management, production, accounts payable/receivable, general ledger, payroll | IBM System/34, 36, 38, IBM PC, IBM micros | All | Both | No | Yes | Yes | Yes | No | No | 43 | $2,520-$11,000 |
| **Jacobsen and Associates, Inc. (818) 575-7504** | Jacobsen | Small- to medium-size manufacturers | 23 | MRP, bill of materials, routing, shop floor control, shop loading, purchasing | Data General MV series | All | Regeneration | Yes | No | Yes | Yes | No | Yes | 62 | $2,000-$20,000 |
| **Keystone Information Systems, Inc. (609) 722-0700** | Intrepid MMS | Manufacturers with $10 million to $180 million in sales | 19 | MRP, MPS, customer order processing, product data management, inventory management, general ledger | All Prime hardware | Most | Both | No | Yes | Yes | Yes | Yes | Yes | 150 | $5,000-$9,000 |
| **Leland, Inc. (404) 998-3500** | Leland MRP | Manufacturers with $50 million+ in sales | 5 | MRP, customer order servicing, purchasing, requisitions, receiving | IBM 4300, 3080, 3090, 9370 series | All | Both | No | No | No | Yes | No | No | — | $22,000 |
| **MAI Basic Four, Inc. (714) 731-5100** | Manbase Manufacturing System | Discrete, process and repetitive manufacturers with $25 million to $100 million in sales | 15 | Prospecting and sales management, order management, product/routing definition, materials and capacity planning, production/activity control, inventory and purchasing | All MAI Basic Four hardware | Most | Both | Yes | Yes | Yes | Yes | Yes | Yes | 400 | $4,500 (average) |
| | Manufacturing System | Value-added distributors, make-to-order, make-to-stock, job shop manufacturers with $2 million to $20 million in sales | 12 | Order administration, inventory control, purchase order processing, engineering control, manufacturing control, manufacturing planning | All MAI Basic Four hardware | Most | Both | Yes | No | Yes | Yes | Yes | Yes | 1,000 | $4,000 (average) |
| | Sewn Products System | Apparel/apparel accessory, footware, home furnishing manufacturers, textile/manufacturers with $5 million to $50 million in sales | 12 | Allocation/pink slip generation, piecework payroll, plant loading, sales order processing, cut and sold reporting, fabric and trim requirements | All MAI Basic Four hardware | Most | Regeneration | No | NA | Yes | Yes | Yes | No | 300 | $3,700 (average) |
| **MCBA, Inc. (818) 242-9600** | MCBA Manufacturing System | Discrete manufacturers with $3 million to $100 million in sales | 19 | MRP, inventory control, shop floor control, costing, financials, distribution | Wang VS, DEC PDP-11, all DEC VAX, all Altos, HP 3000 system (in development) | Some | Regeneration | No | No | Yes | Yes | No | No | 500 | $3,000-$9,000 |

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MC Software, Inc. (800) 824-5952, (916) 756-8104 (in Calif.) | Inmass II | Discrete assembly manufacturers, job shops, distributors | 11 | MRP, inventory, order entry, purchasing, bill of materials, job cost/work in process | Microsoft MS-DOS 2.0 or higher, CPN 86, Digital Research's Concurrent DOS, Novell Netware | All | Regeneration | No | No | Yes | Yes | No | No | — | $695-$1,295 |
| MDS Qantel, Inc. (415) 887-7777 | QMRP | Discrete manufacturers with $3 million to $75 million in sales | 17 | Complete material management, sales order processing and quotations, material/capacity scheduling and planning, shop floor data processing, comprehensive purchasing applications, complete financials | All Qantel micro, mini and supermini computers | Most | Both | Yes | Yes | Yes | Yes | No | Yes | 500+ | $1,250-$10,000 |
| MMS International (614) 895-0738 | MCS-3 | Repetitive manufacturers | 8 | MRP, inventory control/bill of materials, shop floor control/job costing, customer order entry/sales analysis, capacity planning, purchase order control | Any hardware supporting Unix, Microsoft Xenix, MS-DOS | All | Both | No | Yes | Yes | No | No | No | 350 | $950-$2,500 |
| | Syman | Job shops, discrete and made-to-order manufacturers | 9 | MRP, job shop, purchasing, order entry, inventory control, general ledger | Any hardware supporting Unix, Microsoft Xenix, MS-DOS | All | Both | No | Yes | Yes | Yes | Yes | Yes | 110 | $795-$16,995 |
| MRM, Inc. (414) 792-0400 | Pacs-38 | All manufacturers | 12 | Master scheduling/MRP, engineering data base, capacity management, shop floor control, standard cost/job cost, order entry | Wang VS series | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 250 | $2,000-$23,000 |
| | Pacs-36 | All manufacturers | 12 | Master scheduling, engineering data base, capacity management, shop floor control, standard cost/job cost, order entry | IBM System/36 | Most | Both | No | Yes | Yes | No | No | No | 125+ | $2,000-$10,000 |
| | Pacs-VS | All manufacturers | 12 | Master scheduling/MRP, engineering data base, capacity management, shop floor control, standard cost/job cost, order entry | Wang VS series | All | Both | Yes | Yes | Yes | Yes | No | Yes | 200+ | $2,000-$23,000 |
| Madic Corp. (408) 988-8311 | Madic | General manufacturers with $300+ million in sales | 21 | Manufacturing, engineering, finance and accounting, marketing and sales, human resources | Prime 50 series superminicomputers, any hardware that supports Pick operating systems | All | Regeneration | No | No | Yes | Yes | Yes | Yes | 118 | $35,000-$225,000 (total system cost) |
| Management Science America, Inc. (404) 239-2000 | Amaps/M | Discrete, repetitive, process manufacturers | 14 | MPS, inventory control, product costing, manufacturing accounting, multiplant, purchasing | IBM 4300 series, 3030, 3080, 3090, IBM plug-compatible | Most | Both | Yes | No | Yes | Yes | Yes | Yes | 225 | $290,000-$580,000 (total system cost) |
| | Amaps/Q | Process, repetitive, discrete manufacturers | 19 | MRP, material control, lot trace, scheduled managed production, multiproduct management, cost management | IBM 4300 series, 3030, 3080, 3090, IBM plug-compatible | Most | Both | Yes | Yes | No | Yes | Yes | Yes | 475 | $290,000-$580,000 (total system cost) |
| | Amaps/G | Make-to-order, contract manufacturers, aerospace and defense contractors | 10 | MPR, contract engineering, material control, bill of material, process and routing, purchasing control | IBM 4300 series, 3030, 3080, 3090, IBM plug-compatible | Most | Both | No | Yes | No | Yes | Yes | Yes | 15 | $360,000-$600,000 (total system cost) |
| | Amaps/3000 | Repetitive and discrete manufacturers | 16 | MRP, material control, cost management, scheduled managed production, lot trace, order management | HP 3000 Series 50, 60, 70, HP Spectrum 930, 950 | Most | Both | No | Yes | Yes | Yes | Yes | Yes | 125 | $155,000-$240,000 (total system cost) |
| | Amaps 36/38 | Process, repetitive and discrete manufacturers | 9 | MRP, inventory management, product data management, sales order processing, cash management, purchasing/receiving | IBM System/36, 38 | All | Both | Yes | No | Yes | Yes | Yes | No | 50 | $50,000-$210,000 (total system cost) |
| Manufacturing Decision Support Systems, Inc. (216) 861-8100 | MDSS | Selective repetitive manufacturers | 15 | Estimating and quoting, shop floor control, material control, financial management, marketing management | HP 3000 series | All | Both | No | No | Yes | Yes | No | Yes | — | $36,000-$84,000 (total system cost) |
| Mandata Systems, Inc. (513) 733-8030 | Mandata 2000 | Repetitive process market and configuration applications | 17 | MRP, MPS, order entry/configuration, quotation, multifacility, product costing | IBM 4300, 9370 series, DEC VAX, ADDS Mentor, all Ultimate hardware | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 100+ | $2,000-$6,000 |
| Manufacturing Solutions and Systems, Inc. (414) 786-1172 | Manufacturing Control System | Manufacturers with up to $100 million in sales | 11 | MPS/MRP, CRP, engineering data base, standard product costing, work in progress, job/inventory costing | IBM System/34, 36, 38 | Most | Regeneration | No | No | Yes | No | No | No | 45 | $1,500-$15,000 |
| Marcam Data Systems Corp. (617) 449-5510 | Prism | Process and/or repetitive manufacturers | 4 | Foundation, resource management, resource processor, planning | IBM System/38 | All | NA | Yes | Yes | Yes | Yes | Yes | NA | 22 | $20,000-$25,000 |
| Martek, Inc. (800) 323-6885 | Advanced Integrated Manufacturing System | Small- to medium-size manufacturers | 20 | MRP, production scheduling, shop floor control, order tracking, job costing, custom report generator | All IBM PC-DOS, Microsoft MS-DOS, Xenix systems, Altos | Some | Regeneration | No | Yes | Yes | Yes | Yes | No | 85 | $2,000-$3,000 |
| Martin Marietta Data Systems (800) 654-3935 | MAS Manufacturing | All manufacturers | 14 | Manufacturing planning control system, financial management system, sales order management system | HP 3000, DEC VAX, IBM 4300, 3080, 3090 series | All | Both | No | No | Yes | Yes | No | Yes | 700 | Contact vendor |
| McCormack & Dodge Corp. (800) 343-5401, (617) 655-8200 (in Mass.) | Production and Inventory Optimization System | Discrete and process manufacturers | 9 | Inventory/MRP, MPS, bill of materials, shop floor control, purchasing, cost management | IBM 4300, 3080, 3090 series and compatibles, DEC VAX 8600 | All | Both | Yes | Yes | No | Yes | No | No | 30 | $30,000-$70,000 |
| | C/PIOS | Aerospace and defense contractors | 9 | Inventory/MRP, MPS, materials management, bill of materials, shop floor control, purchasing | IBM 4300, 3080, 3090 series and compatibles | All | Both | Yes | Yes | No | Yes | No | No | 30 | $40,000-$130,000 |
| Micro-MRP, Inc. (800) 338-6921, (800) 523-9577 (in Calif.) | Max, The Production Manager | Manufacturers with up to $25 million in sales | 17 | MRP, bill of materials, inventory control, master scheduling, purchasing, shop floor control | IBM PC and compatibles, Northstar Dimension | Most | Both | No | Yes | Yes | No | No | Yes | 350 | $2,000-$4,000 |

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Minx Software, Inc. (415) 969-6528** | Minx Information System | Manufacturers with up to $250 million in sales | 9 | MRP, order management, accounts receivable, accounts payable, general ledger, report writer | HP 9000, DEC VAX, AT&T 3B, Unisys 5000 series, Stratus XA 2000, IBM AT, Altos 3068 | All | Regeneration | Yes | No | Yes | Yes | No | Yes | 30 | Starts at $20,000 (total system cost) |
| **Mitrol, Inc. (617) 933-9545** | Mitrol MFG | All manufacturers | 18 | Materials management, shop floor control, sales order management, aerospace and defense, management summary, cost planning and control | IBM 3090, 4300 series, 9370, PC AT/370 | All | Net change | No | Yes | Yes | Yes | Yes | Yes | 45 | Contact vendor |
| **NCA Corp. (408) 986-1800** | Maxcim | Manufacturers with $3 million+ in sales, Fortune 500 companies | 22 | Manufacturing applications, financial applications, sales/marketing applications, information management, repetitive manufacturing configurator | All DEC VAX systems | All | Regeneration | No | No | Yes | Yes | No | Yes | 550 | $1,000-$40,000 |
| **Norampac Software Ltd. (416) 831-0515** | MRP II | Manufacturers with $20 million+ in sales | 9 | MRP, inventory, manufacturing costing, capacity planning, work order management | All IBM mainframes | Most | Both | Yes | No | No | Yes | Yes | No | — | $65,000-$80,000 |
| **Northeast Data Systems, Inc. (617) 273-2920** | Intrepid Manufacturing Management System | Manufacturers with $10 million to $100 million in sales | 19 | Quotations, marketing, inventory management, production, cost, financials | All Prime hardware, Honeywell DPS 6, IBM 9370, 4300, 3080, 3090 series, DEC VAX | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 65 to 70 | $3,000-$15,000 |
| **On-Line Software Labs, Inc. (714) 680-0502** | Distribution, Manufacturing, Accounting, Costing, Scheduling | All manufacturers | 18 | MRP, DRP, order entry, shop floor control, financials, purchasing | Unisys A series | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 50 | $63,800 (total system cost) |
| **Oriole Software, Inc. (301) 823-0551** | Respond | Discrete, repetitive/Just-in-Time manufacturers, government defense contractors | 13 | MRP, factory management, shop floor control, product assurance, time and attendance, simulation | All Tandem hardware | All | Net change | No | No | Yes | Yes | Yes | No | 5 | $25,000-$45,000 |
| **Pansophic Systems, Inc. Applications Products Company (312) 954-3600** | Manufacturing/ 38 | All manufacturers | 17 | MRP, DRP, MPS, CRP, product structure, product standard casting | IBM System/38 | Most | Regeneration | Yes | Yes | Yes | Yes | Yes | No | 500 | Contact vendor |
| **Pilot Systems, Inc. (414) 792-0050** | Manufacturing Software | Manufacturers with $2 million to $50 million in sales | 8 | MRP, manufacturing control, manufacturing costing, engineering control, inventory control, sales/accounting control | HP 9000, NCR Tower, Unisys 5000 | Most | Both | Yes | Yes | Yes | Yes | No | No | 600 | $5,000-$10,000 |
| **Profit Center International, Inc. (416) 475-1101** | Control | Process, pharmaceutical, food, electronic and jewelry manufacturers | 17 | MPS, MRP, distribution, capacity planning, cost accounting, finance | IBM System/36 | All | Both | No | Yes | Yes | Yes | No | Yes | 1 | $6,000-$12,000 |
| **Profitkey International, Inc. (603) 898-9800** | Manufacturing System | Small- to medium-size manufacturers | 13 | MRP, shop floor control, purchasing, financials, estimating, customer management | IBM AT, NCR Tower series, AT&T PC and 3B series, Unisys PC-IT 5000 series, DEC Microvax line | All | Regeneration | No | Yes | Yes | Yes | No | No | — | $15,000-$55,000 (total system cost) |
| **Pro:Man, Inc. (206) 451-0404** | Pro:Man | Small- to medium-size manufacturers | 18 | MRP, sales order processing, purchase order control, shop floor control, integrated financials | IBM 286 or 386, IBM minis and mainframes, Honeywell minis, DEC VAX, NCR Tower | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 220 | $5,000 (total system cost) |
| **STSC, Inc. (301) 984-5488** | Logistics Plus System | Repetitive and process manufacturers | 10 | MRP, CRP, forecasting, distribution resource planning, master scheduling, bill of materials/routings | IBM 4300, 3080, 3090, 9370 series | All | Both | Yes | No | No | No | No | No | 3 | $165,000-$415,000 (total system cost) |
| **Safe Computing Ltd. (416) 826-5352** | Safe S2000 | Make-to-stock manufacturers with $10 million to $40 million in sales | 5 | MRP, bill of materials, costing, work-in-progress, capacity planning | Any system supporting Unix, DEC VAX, ICO minicomputer | Most | Regeneration | No | Yes | Yes | Yes | No | Yes | 10 | $10,000 (average) |
| **Satcom, Inc. (800) 472-8266** | Quality and Manufacturing System | Process manufacturers | 8 | Quality and specifications, materials management, production management, customer order processing, purchasing/receiving, summary analysis | HP 3000 | Most | Net change | Yes | No | Yes | Yes | Yes | No | 31 | $25,000-$30,000 |
| **Stolzberg Research, Inc. (516) 751-4277** | Accumark PIQ | All manufacturers | 4 | MRP, inventory, bill of materials, purchasing | IBM PC, XT, AT and compatibles | Most | Regeneration | No | No | Yes | Yes | No | No | 75 | $800 |
| **Systems for Profit, Inc. (414) 327-7560** | CMI Profit | All manufacturers | 8 | Accounting, manufacturing planning, manufacturing control, engineering control, inventory control/sales control, manufacturing costing | Unisys 5000 series, NCR Tower, all Altos hardware, IBM AT, System/36, 38, PC | All | Both | Yes | Yes | Yes | No | No | No | 1,100+ | Contact vendor |
| **Systems Software Associates, Inc. (312) 641-2900** | BPCS | Manufacturers with $5 million to $200 million in sales | 23 | MRP, MPS, capacity planning, inventory management, shop floor control, Just-in-Time | IBM System/36, 38 | All | Both | Yes | No | Yes | Yes | Yes | Yes | 400+ | $10,000 (for System/38), $2,000-$5,000 (for System/36) |
| **TEC Computer Systems, Inc. (617) 964-3890** | Advanced Manufacturing and Financial System | Discrete and process manufacturers | 12 | MPS/MRP, inventory control, bill of materials, purchasing, production control, sales order management | DEC VAX | All | Both | No | Partial | Yes | Yes | No | Yes | — | $15,000-$20,000 |
| **Telet Corp. (312) 571-8111** | TIMS | All manufacturers | 24 | MRP, MPS, shop floor control, production control, manufacturing control, general ledger | Prime 50 series superminicomputers | All | Both | Yes | Yes | Yes | Yes | Yes | Yes | 5 | $20,000-$60,000 (total system cost) |
| **Thomas-Laguban & Associates, Inc. (414) 792-0300** | IM-SS | All manufacturers | 12 | MRP, engineering records, inventory, purchasing, manufacturing order control, shop floor control | IBM 4300 series or higher | All | Both | No | Yes | Yes | Yes | Yes | No | 25 | Contact vendor |

| COMPANY | PRODUCT NAME | TARGET MARKET | TOTAL NUMBER OF MODULES | MAJOR MODULES (SIX MAXIMUM) | HARDWARE REQUIRED | AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME | NET CHANGE- OR REGENERATION LOGIC-BASED | OFFERS DISTRIBUTION RESOURCE PLANNING | TOOL PLANNING AND SCHEDULING | INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM | APPLICATIONS AND DBMS INTEGRATION | RELATIONAL DATA BASE MANAGEMENT FEATURES | FOURTH-GENERATION DEVELOPMENT TOOLS | NUMBER OF CURRENT U.S. SITE LICENSES | PRICE PER MODULE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Uniq Digital Technologies, Inc. (312) 879-1008** | Spider II | Manufacturers with $5 million to $40 million in sales | 15 | MRP, shop floor control, job costing, standard product routings, inventory management, bill of materials | DEC PDP series, VAXs, AT&T 3B series | All | Regeneration | No | No | Yes | Yes | No | No | 500 | $3,500-$7,000 |
| **Unitronix Corp. (609) 424-3693** | Praxa | General manufacturers and distributors | 18 | MRP, master scheduling, capacity planning, order entry/invoicing, sales/bookings analysis, inventory control | DEC VAX | All | Regeneration | Yes | Yes | Yes | Yes | No | Yes | 150 | $8,000-$10,000 |
| **Userware International, Inc. (619) 745-6006** | Pioneer Command | Wholesale distributors, batch assembly | 14 | Sales order processing, purchase order processing, general ledger, production control, sales analysis | DEC VAX | Most | Regeneration | No | Yes | Yes | Yes | Yes | Yes | 12 | From $6,000 |
| **Vertical Business Software, Inc. (914) 632-8305** | Manufacturer with Process Control | Small- to medium-size manufacturers | 3 | Accounts payable/general ledger, payroll, manufacturing, process control | IBM PC and compatibles, Novell Netware hardware | All | Both | Yes | No | Yes | Yes | Yes | Yes | 30 to 40 | $2,000-$2,800 |
| **Xerox Corp. (800) 223-3799** | Xerox Business Management System | Discrete manufacturers | 17 | MRP, MPS, repetitive manufacturing, production control, inventory management, cost planning and control | IBM 4300 series, 3080, 3090, 9370 | All | Net change | Yes | Yes | Yes | Yes | No | Yes | 500 | From $225,000 |
| **Louis A. Wright & Associates, Inc. (313) 459-7760** | Automated Manufacturing Planning System | Highly repetitive manufacturers | 10 | MRP, resource scheduling, general ledger, accounts receivable, accounts payable, payroll | IBM System/36 | Most | Net change | Yes | Yes | Yes | Yes | — | Yes | 50 | $3,000-$21,000 |
| | Access | Job shop contract manufacturers | 10 | Job costing/estimating, order entry/shipping/invoicing, inventory, purchasing, general ledger, accounts receivable/payable | IBM System/36 | All | Regeneration | Yes | Yes | Yes | Yes | — | Yes | 20 | $3,000-$7,500 |


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INSIDE

...e Depth: Price Waterhouse expects more from microcomputers. 53

...Spotlight: New tools help managers of IBM networks get a better handle on planning and problem prevention. Pullout section, follows page 52

IBM revs up 3090

*Lack of advance notice riles users*

...charges foot-dragging on ...

'Frosted'

...chines, including its most powerful computer ever. But the announcement was clouded by concerns over limited and costly upgrade paths set for current 3090 users.

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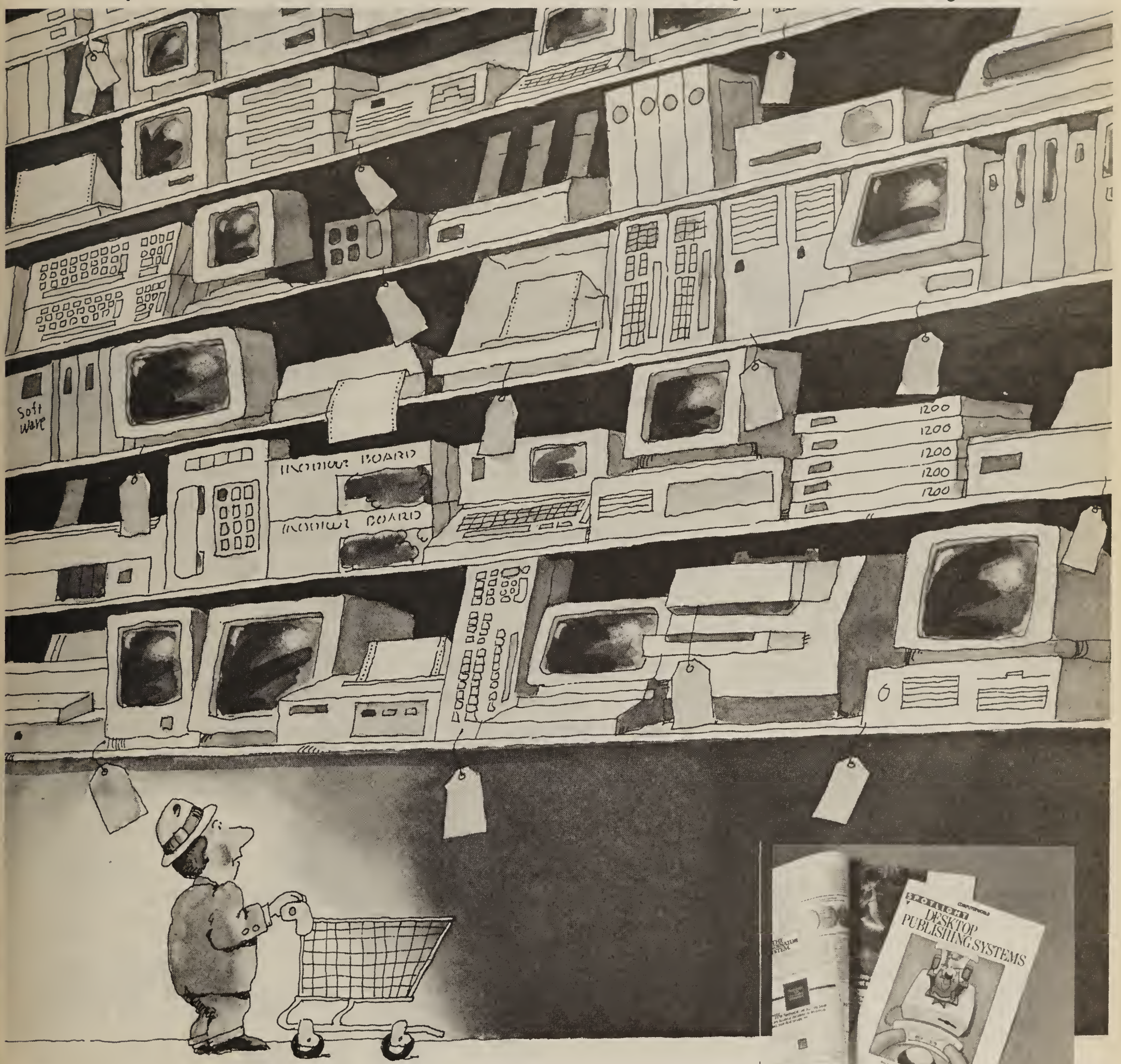

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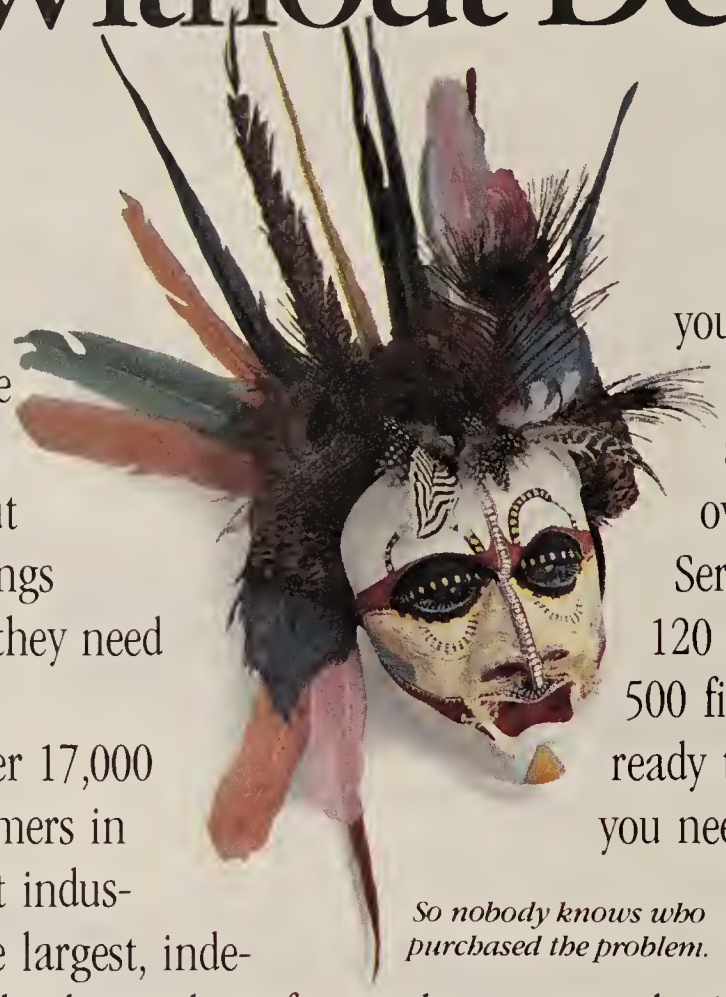

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HARD TALK

*James Connolly*

## Godzilla gets serious

The symbolism has been used before. It pops up when IBM gets serious about a field in which dozens of smaller companies are running about with their own profitable, 10% market shares.

"Bambi meets Godzilla" rings crunchingly true again, just as it did a few years ago when it was used to illustrate IBM's impact on victims such as the then-blossoming microcomputer vendors.

This time, Godzilla's shadow is falling on the ASCII terminal makers, whose competition for market share has — compared with what is to come — been about as violent as yearlings going through their first rutting. There was plenty of head-butting but minimal damage. Those vendors would undercut each other by a few bucks — OK, a few dollars — and would claim to be a bit better than the big guys. But the big guys were companies such as Wyse Technology, which is roughly 200 times smaller than IBM.

Then IBM included in its re-

*Continued on page 51*

# DEC minisuper foray looms

*Predicted late '88 entrance would speed shakeout in $300M market*

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Vendors in the minisupercomputer market are preparing for an invasion by Digital Equipment Corp. in late 1988 that may accelerate the shakeout under way in this market, according to speakers at a recent conference on advanced computer systems.

The market now includes such firms as Alliant Computer Systems Corp., Convex Computer Corp., Scientific Computer Systems Corp. and Floating Point Systems, Inc.

The firms typically sell systems in the performance range of 6 million to 40 million floating-point operations per second — a $300 million market niche just below that of Cray Research, Inc.'s supercomputers.

The future of this young market was of keen interest at the second annual Conference on Advanced Computer Systems, held here last week by Technologic Partners and Kidder, Peabody & Co.

**Predict DEC's entrance**

Vendors and analysts predicted that DEC will enter the market in the next 18 to 24 months with vector extensions to the high end of its VAX architecture.

Robert J. Paluck, president and chief executive officer of Convex in Richardson, Texas, said DEC users have told his company that the DEC product, called Pegasus, will be a four-head parallel processing machine and run at 15 million instructions per second.

Jeffry Canin, senior technology analyst for Hambrecht & Quist, Inc., an investment banking firm in San Francisco, said the minisupercomputer niche is now saturated with suppliers and that the DEC entry will hasten the shakeout, leaving only two or three major survivors. He said it is not clear who the victims will be.

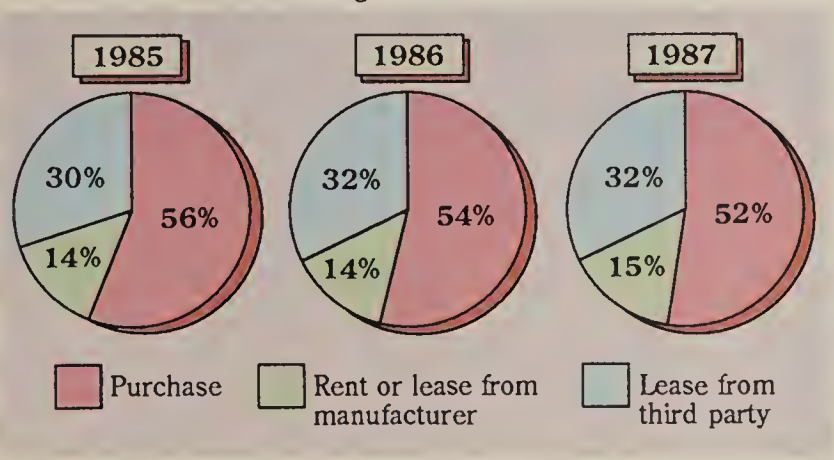
Already, Canin said, two firms have been forced out of the minisupercomputer market, and Beaverton, Ore.-based Floating Point Systems is retrenching with layoffs and a corporate reorganization [CW, June 8].

"Most institutional investors will buy into two or three of the companies — and quickly flee from whichever gives the first hint of faltering," said Richard A.

*Continued on page 50*

## Data View

Mainframe system acquisition
*Changes in method*




INFORMATION PROVIDED BY DATAPRO RESEARCH CORP.
CW CHART

# Edge claims 11-MIPS mini

BY STANLEY GIBSON
CW STAFF

SCOTTSDALE, Ariz. — Edge Computer Corp. recently announced a dual-processor minicomputer, the Edge 1200, which it claims can perform 11 million instructions per second (MIPS). In addition, the company announced the single-processor Edge 1100, which it rated at 6 MIPS.

*Continued on page 51*

# Memorex deals IBM add-in card

BY STANLEY GIBSON
CW STAFF

MILPITAS, Calif. — Marking its re-entry into the memory board market, Memorex Corp. recently announced add-in memory cards for IBM System/38 processors.

A Memorex spokesman said the firm will be offering memory boards for other IBM mid-range machines in the future. Memorex sold memory for IBM 370 processors in the late 1970s. Memorex announced the System/38 memory boards for the European market in February and has been selling them there for several months.

"Our research shows a large number of System/38 users to be upgrading their processors," said Greg Grodhaus, Memorex's U.S. vice-president of the small systems group. "We're finding that users are installing IBM's Control Program Facility Re-

*Continued on page 50*

**Inside**


- DG releases Rugged, Tempest versions of MV/15000 series. Page 50.
- Computervision announces 4-MIPS graphics workstation. Page 52.
- Eastek adds departmental image scanner to document processing system. Page 52.



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# DEC foray

FROM PAGE 47

Shaffer, editor of the "Computer Letter" newsletter and head of Technologic Partners in New York. He reported that sales are strongest at Alliant and Convex.

Jack W. Hugus, president and CEO of Scientific Computer Systems in San Diego, Calif., said DEC will be a "formidable contender." But executives from Alliant and Convex claimed that they can beat DEC in the market because of their focused sales efforts, high-performance products and loyal customers.

By the time DEC enters the market, Convex's Paluck said, Convex will have several hundred installations worldwide, a dominant position in specific market segments and many new products.

The situation is similar to the engineering workstation market led by Apollo Computer, Inc. and Sun Microsystems, Inc., Paluck said. "Companies like IBM and DEC are actually playing catch-up . . . because they can't move fast enough," he said.

The recent strategic alliance between DEC and Cray, focusing on an interface between DEC's VAX minicomputers and Cray's X-MP supercomputers [CW, June 8], was a defensive move by DEC to buy time until it can enter the minisuper market, according to a report by researchers Piper, Jaffray & Hopwood, Inc. "The early successes of minisuper vendors like Alliant, Convex and Scientific Computer Systems have largely come at the expense of DEC," the report said.

Recent DEC alliances with Cray and Floating Point Systems are "part of a DEC stopgap strategy to slow the penetration of minisupers into the VAX installed base until DEC can respond with a minisuper of its own, probably within the next 12 to 18 months," the report said.

# Memorex

FROM PAGE 47

lease 8 because they want to improve response times, support additional system users and add new application programs. All these measures frequently require more main memory," he added.

The memory cards, called the 9000 series, reportedly are available in sizes of 1M, 2M and 4M bytes, priced at $3,500 per megabyte. The cards are said to be compatible with the System/38 CPU, microcode and software. They can be transferred between different models of the System/38 family, from the Model 6 through Model 700.

Made for Memorex by Locom Corp., the boards are available immediately.

# DG rolls out top guns for military

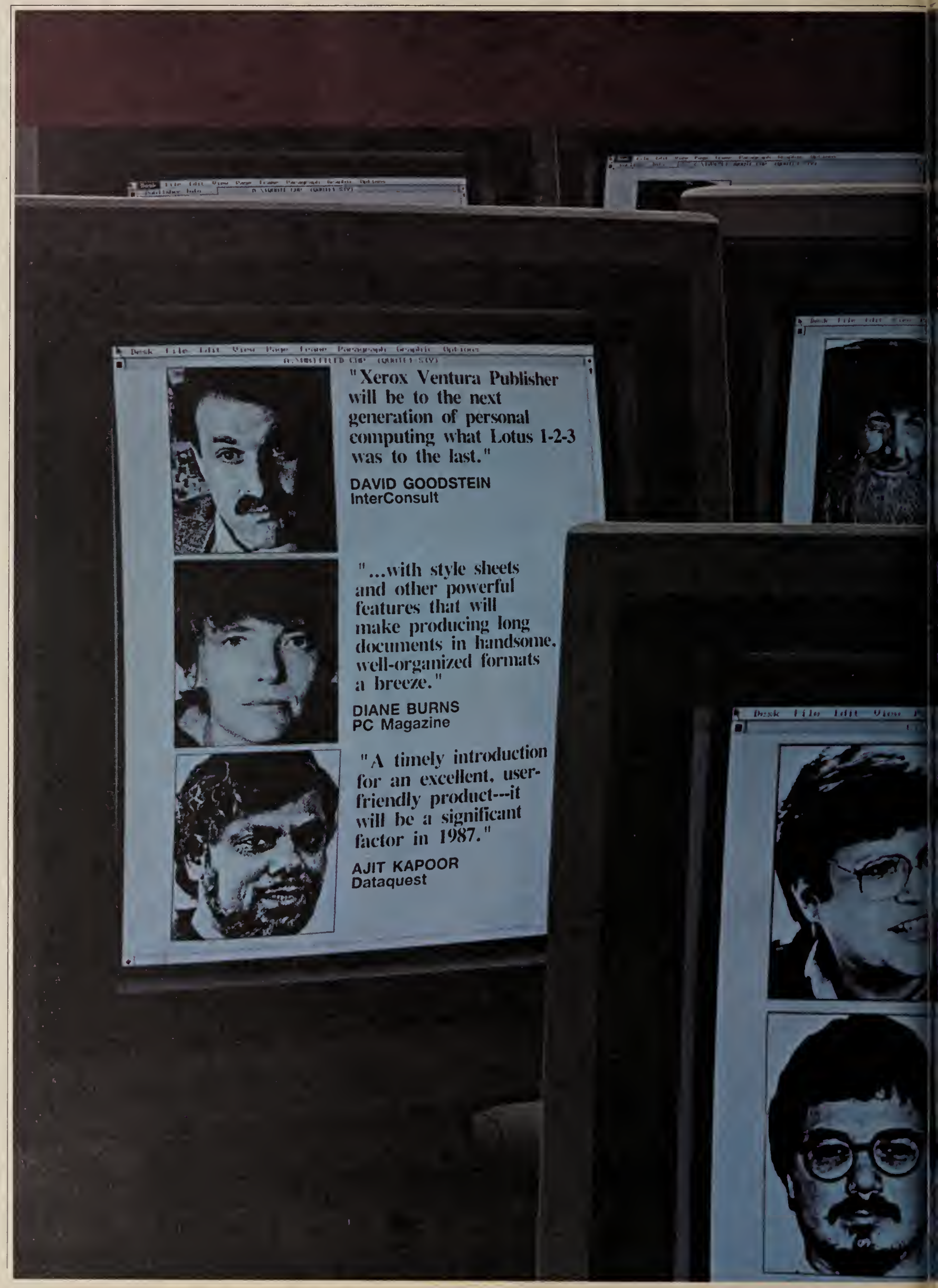
WASHINGTON, D.C. — At a recent convocation of U.S. Armed Forces computer users, Data General Corp. released the Rugged and Tempest versions of its 6-month-old MV/15000 computer series.

The Eclipse MV/15000R, called Rugged, and the MV/15000T, or Tempest, series range in power from 2.9 million to 6.4 million instructions per second, the company said.

The Rugged models, which are said to meet military standards for withstanding vibration, shock, extreme temperatures, humidity and poor air quality, cost from $117,500 to $284,000. The Tempest version, which is said to satisfy the Nacsim 5100A Tempest requirements, costs from $177,000 to $299,000. There are three models of each version.

DG also released a Tempest terminal, the $2,805 Dasher D461T; a $30,000 Rugged 234M-byte removable-disk subsystem; and fiber-optic communications converters, priced at $480 per pair, for connecting terminals or printers to the host.

Available operating systems include the time-sharing AOS/VS, the real-time AOS/RT32 and DG/UX, a standard AT&T Unix System V implementation.



# Godzilla

FROM PAGE 47

cent announcements an entry-level ASCII terminal priced at$399, which is 42% below its previous low-end price of $695. That undercut many competitors' prices, and IBM added that the 3151 display station can be used not only with IBM ASCII hosts such as the Series/1 and RT Personal Computer but with various other hosts through Digital Equipment Corp. and Wyse emulation cartridges.

Making it still tougher on ASCII vendors whose customers might have "buy American" policies, IBM officials just happened to say that the 3151 is made entirely in the U.S. At least IBM did not mention that many of the other ASCII vendors rely on off-shore manufacturing facilities in locations such as South Korea and Taiwan.

According to International Data Corp. (IDC), a Framingham, Mass.-based market research firm, IBM shipped 39,000 of the 1.27 million ASCII-type terminals sold in the U.S. in 1986. The market leader was Wyse, which shipped 281,000 terminals.

IDC Senior Research Analyst Diane Farrell called the ASCII market a slow growth area and said, "It's not likely that IBM can come in and grab a share of the market without hurting someone else." She described IBM's plans as a statement that IBM is getting tough.

IBM's move does not mean all ASCII terminal makers are about to be crushed. Companies such as Wyse should be able to respond. Even some of the smaller vendors may undercut or at least match IBM's price and claim functional superiority.

But pity the little vendor whose slim profit margins are about to be squeezed again, when IBM charges into a customer site with a competitive price and the backing of a $51 billion company.

What the customer should hope for is that enough alternative suppliers survive to keep the market competitive. But what they should be wary of is the first vendor to come calling with the statement, "IBM's presence legitimizes our market." That has been said before, usually by vendors who would not be around to service their product because Godzilla was behind them.

Connolly is *Computerworld's* senior editor, systems & peripherals.

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# Edge

FROM PAGE 47

Edge machines include a proprietary microprocessor design manufactured by National Semiconductor Corp. that emulates the Motorola, Inc. 68000 instruction set, according to Phillips W. Smith, chief executive officer and chairman of Edge.

"People using the 68000 chip can move to Edge computers with virtually no porting of the software," Smith said.

### High-end machines

Value-added resellers and system integrators offering products using the 68000 microprocessor may want to resell the Edge systems as their high-end machines, Smith said. "We want resellers and integrators to see our products as ideal for applications where their customers need more than 6 MIPS at their fingertips," he said.

Smith likened the dual-processor's power to that of Digital Equipment Corp.'s VAX 8800. He said the new processors are ideal for applications involving more than 64 users, especially when the work requires graphics, imaging, communications and the use of relational data bases. The superminis are also well-suited for electrical and mechanical computer-aided design applications, Smith said.

The Edge 1200 contains 8M bytes of system memory, 337M bytes of hard-disk storage and Edge's GSX Unix operating system, which is based on AT&T's Unix System V, Release 2. The Edge 1200 is priced at about $128,000; the single-processor Edge 1100 in the same configuration costs $104,000. Edge said it will begin shipping the machines in July, with volume shipments beginning in September.

## NEW PRODUCTS

### Processors

**CIE Systems, Inc.** has expanded its family of 32-bit multiuser business computer systems with the addition of the **CIES 680/550** high-end system and the **CIES 680/50** entry-level system.

The CIES 680/550 features a 25-MHz Motorola, Inc. 68020 CPU, 45-nsec 1M-byte memory chips and a high-speed 4M-byte small computer systems interface disk cache. The system can support 250 users. A standard configuration costs $125,995.

The CIES 680/50 features a 68020 CPU running at 16.7 MHz and support for eight users. A basic configuration costs $12,750.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

### CAD/CAM/CAE

**Computervision Corp.** has announced a graphics workstation said to deliver 4 million instructions per second (MIPS) integer performance and 125K floating-point operations per second.

The system, called the **Caddstation 34**, includes a 64K-byte virtual-address memory cache and high bandwidth as well as a 64-bit processor-to-memory bus. It features Sun Microsystems, Inc.'s Sunos 3.2 release of the Unix operating system, the vendor said.

A sample configuration includes the 4-MIPS CPU, 16M bytes of main memory, a ½-in. tape, a 515M-byte hard disk, an Ethernet interface and a color monitor. It costs $90,400.

Computervision, 100 Crosby Drive, Bedford, Mass. 01730.

### Data storage

**Eastek Corp.** has added a **departmental image scanner** to its optical disk-based document processing system.

The departmental scanner is said to scan up to 20 letter-size page/min. It processes paper sizes ranging from 3 by 5 in. to 8½ by 11 in. at a density of 200 dot/in. The document processing system is based on a distributed workstation environment and uses the Apollo Computer Corp. Domain local-area network.

The departmental image scanner option is priced at $17,500.

Eastek, 10 Bloomfield Ave., Pine Brook, N.J. 07058.

### Terminals

**Teleray**, a division of Research, Inc., has enhanced its **Model 20-DHP** to include type-ahead and return and enter features as well as a dual-port option that allows the terminal to operate and maintain sessions with two Hewlett-Packard Co. hosts or an HP and a Digital Equipment Corp. host or two DEC hosts.

Other 20-DHP enhancements include the addition of a soft-white 14-in. CRT and a simplified lock capability that is implemented with a single keystroke in set-up mode. Standard features include 8-page display memory, bidirectional printer port, 80- or 132-col. display and separate VT220 emulation mode.

The 20-DHP is priced at $1,295.

Teleray, Box 24064, Minneapolis, Minn. 55424.

### Printers/Plotters

The **Model 6704** 400 line/min dot matrix line printer designed for use with IBM System/34, 36 and 38 minicomputers has been unveiled by **Decision Data Computer Corp.**

The Model 6704 is said to emulate the IBM 5256, 5224 or 5234 dot matrix line printers. Character resolution is 60 by 120 dot/in. in the draft mode and 90 by 180 dot/in. in the near-letter-quality mode, according to the vendor. Character and line spacing are variable. Print speed is 400 line/min in the draft mode, 300 line/min in the data processing mode and 175 line/min in the near-letter-quality mode.

The Model 6704 printer is priced at $6,995.

Decision Data, 400 Horsham Road, Horsham, Pa. 19044.

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For PC users, the PageWriter Model 1080 offers Diablo 630 and Epson FX-80 emulation. And emulation is selectable from the front panel, eliminating clumsy internal dip-switches.

The PageWriter Model 3080 is right at home in 3270 systems. It connects via standard coaxial cable to any Cluster Controller or a 4331 Display Adapter.

Model 5080, for System 34/36/38, uses standard twin-axial connectors, and emulates the IBM 5219.

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# Which data is which?

*To get a workable picture of corporate data, MIS needs a framework for data engineering*

BY SERGIO FAISSOL

The discipline of data base engineering concerns itself with managing data as a corporate resource. Traditionally, development has concentrated on designing correct and efficient algorithms to collect and process data, thus making it available to the various parts of an organization.

Data base technology was born of the need to share data and make it easier to adapt to unforeseen applications. Data has been too closely tied to the applications for which it was originally defined. This flaw has created a number of problems, the least of which is wasting storage resources by filling it with redundant data.

Modern data base management systems provide increasing amounts of data independence — which is supposed to facilitate the separation of data from individual applications — in addition to backup and recovery facilities for on-line processing, teleprocessing, screen-handling capabilities and even integrated fourth-generation languages.

With all of these facilities available, why do organizations still tie data so closely to applications, and why are they using a DBMS mostly for their fringe benefits — as sophisticated access methods?

The answer is that one of the most important prerequisites for sharing data is not and cannot be supplied by a DBMS. To identify areas with a potential for sharing, companies must analyze data from different applications — data that has been defined, grouped and named in a variety of ways — identify those data elements that can be shown to be the same and then redefine them appropriately.

Better still, companies can design new data in such a way that it can be easily shared and reused. Only when such redefinitions are made can a DBMS be used not just as an access method but also as a tool to manage data as a corporate resource.

Creating a corporatewide integrated data base environment is not an undertaking to be taken lightly. It is not uncommon to find companies with tens of thousands of data elements, most of which are redundant and poorly defined. The sheer volume of data descriptions to be handled, not to mention issues related to the meaning of data and their relationships, make it virtually impossible to approach the overall problem at once in a top-down fashion.

Evidence of this can be readily seen in the failure of a number of expensive, long-term projects that perform data modeling in a careless and grandiose way.

On the other hand, a piecemeal bottom-up approach, which has been used for many years, usually leads to a nonintegrated environment.

## Relating data to business

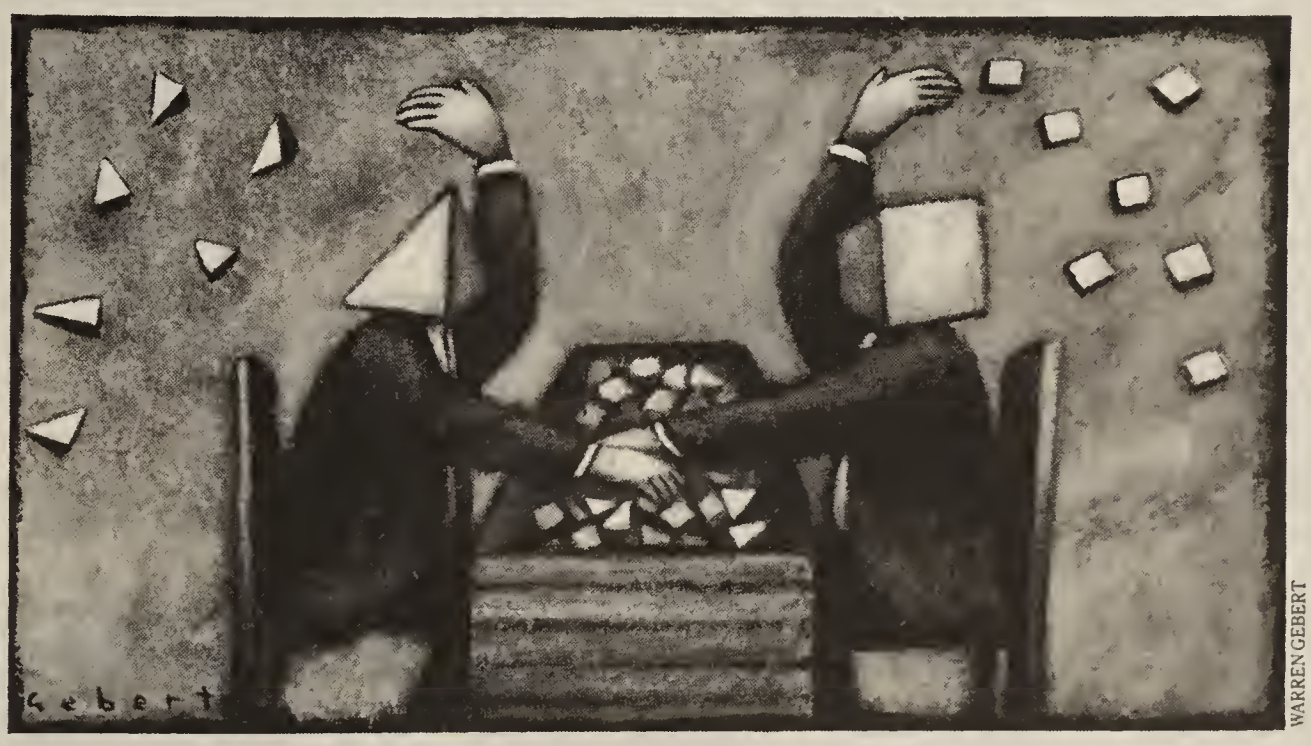
The discipline of data base engineering is concerned primarily with the knowledge and technologies required to define, group and relate data in a way that will promote sharing and reusability as much as possible.

Data analysis is a highly skilled task that requires a profound knowledge not only of a set of techniques but also of the underlying data as it relates to the operation of the business. Equally important is the way in which this knowledge is acquired, stored and communicated to people with backgrounds and experience that can vary from applications programmers to top-level managers.

In leading an organization into an integrated data base environment, data managers must create data abstractions from the requirements level to the lowest and most basic form. Such abstractions should model data that reflects the fundamental nature of the business. It should also be easily understandable throughout the organization and lead to data structures that will minimize redundancy, optimize performance and facilitate evolution.

No single model can accomplish all of this, and attempts to develop one usually end up as expensive mistakes. The level of detail required to fine-tune one individual application makes an overall picture unmanageable. In addition, the desire to prepare for unforeseen uses of data has led data analysts to define and include in their models many unnecessary data elements, which further complicate the issues and increase the amount of work involved.

What is needed is a framework that addresses the data knowledge needs of users, systems developers, data base designers and performance specialists. This framework should




WARREN GEBERT

Faissol is chief scientist at M. Bryce & Associates, Inc. in Palm Harbor, Fla., developer of the Pride data base engineering methodology.

- **Top-down vs. bottom-up compromise**
- **Data from a business point of view**
- **No single model will do**

lend itself to evolutionary development while maintaining a clear overall view. Since most organizations already maintain a multitude of data definitions and existing systems that must be preserved, this framework must be able to handle existing data architectures and still be able to integrate them with new developments.

### Built by evolution

A pure top-down approach to building an enterprise model is rarely possible any place else than in very small companies. The effort and time required for such a project usually discourages the potential beneficiaries — system development, user management and user operations — before the project is complete. Also adding to the problem is that substantial time must be spent resolving conflicts about data definitions in a changing environment. Very often, after all this effort, users see no direct benefit arising from the project.

The best approach in data modeling is to "divide and conquer" but to do so with strong discipline and control to prevent the "conquered territories" from becoming isolated islands with different cultures and languages. In other words, each modeling effort, which may include one or more systems, needs to be carefully integrated with the existing model. Conflict resolution must be done at this time in a nondisruptive way.

As a result of the integration of the model with a new system, changes to existing models may be necessary. This can be achieved without disruption only if the boundaries between logical and physical are sharply maintained so that adjustments to logical models can be made without affecting the physical implementation and vice versa.

### Engineering framework

The framework for data base engineering presents a multilevel view of data. This framework is composed of the following four interrelated data base models, each of which addresses a different aspect of the data base (see chart above):

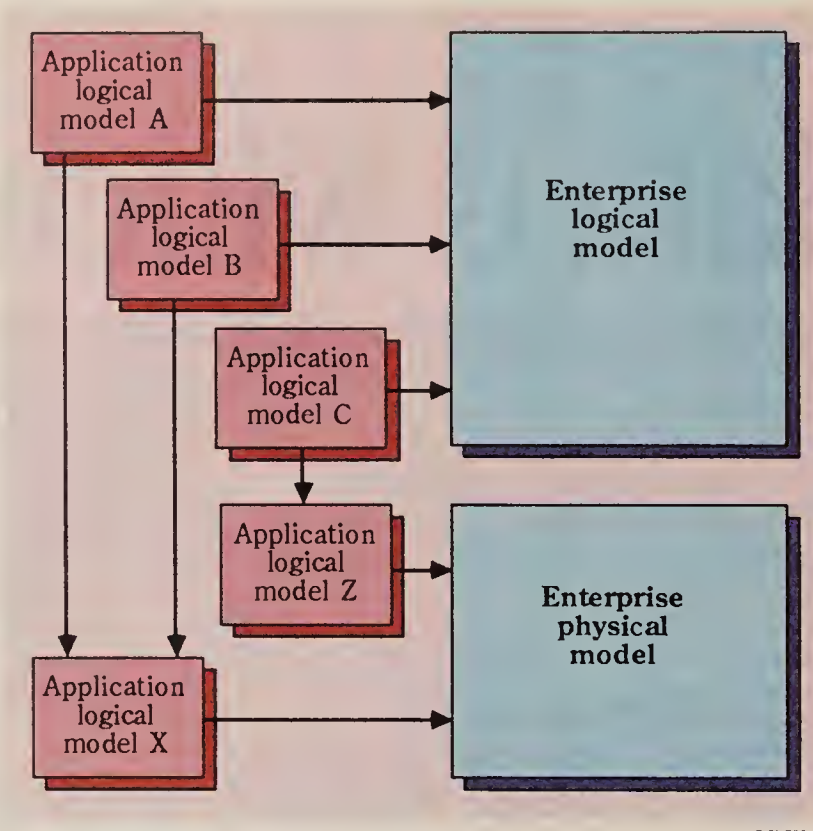
- Enterprise logical data base model.
- Application logical data base model.
- Enterprise physical data base model.
- Application physical data base model.

The logical models rely on the concept of objects and are totally independent of any implementation detail, including access paths. The physical models take into account the type of DBMS used, or the lack of one, and represent actual files and records.

This approach allows the design of proper logical models without disrupting existing data structures no matter how they are organized.

## A framework for data base engineering

*The physical models and logical models represent data differently; together they provide a full picture of corporate data*




CW CHART

**Enterprise logical data base model.** The purpose of this model is to present a logical overall view of all data currently of interest to the organization, excluding implementation-dependent details. It is a meaning-oriented model, intended to provide users and system designers with a global understanding of the data used by the information system that is currently implemented or under development in the organization.

The data is structured into interrelated objects, each representing a certain type of fact or event of interest. These objects are composed of normalized records, which in turn are composed of data elements. This approach provides a stable model, which, when completed, will need to be modified only as the nature of the business changes.

This model is built and maintained by data management in an evolutionary way and is connected to the application logical data base model and the enterprise physical data base model.

**Application logical data base model.** The purpose of this model is to provide systems analysis with a local logical view of the data required for a specific application. There is one such model for each application; each model is related to the enterprise logical model and the application physical model.

The application logical model is composed of a set of interrelated objects, which contains only the data that is required to implement the information requirements for a specific application or system. The objects of this model will eventually be the same as those in the enterprise logical model and will be identified in the same way, but they will be represented by a different level of detail, possibly with different relationships.

**Enterprise physical data base model.** The purpose of this model is to provide data base designers with the freedom to choose the best technology for each new application — a DBMS, disk, tape or even manual files — and keep that technology independent from the logical models.

The enterprise physical model is a global view of all physical files, records and data bases used to implement the objects in the enterprise logical model. It reflects the technology used for implementation at any given time. Objects of the enterprise logical model may be regrouped or split in different ways to compose the enterprise physical model. Performance and security considerations could dictate such rearrangements, which need not necessarily be normalized.

**Application physical data base model.** The purpose of this model is to provide program designers with the physical data structures necessary for their programs. This model may be just a subset of the enterprise physical model that refers to the particular application, or it may depart substantially from it to an extent that it depends on the DBMS or file access methods used.

### Objects

Business facts and events are the backbone of the logical models in data base engineering. They are represented by data abstractions called objects, which are conceptual representations of the facts and events required to operate and manage an enterprise. Objects may be as tangible as a customer, an employee or a vendor or as intangible as a debit, a credit or a transaction. The key point is that objects are used to operate the enterprise and are unique to a specific business or type of business. They do not exist on their own merit; they must have a legitimate bearing on the organization.

Objects are represented by groups of data elements used to define and describe those objects. It is, however, impossible and unnecessary to record every potentially collectible piece of data about an object. Furthermore, it is only necessary to be concerned with certain facts and events of interest to the business. Objects are designed around these facts or events, regardless of physical implementation issues, and at the proper level of detail. This fact/event approach, coupled with normalization techniques, is the key to achieving a stable model that promotes sharing and allows for unforeseen uses of data.

An object instance is defined as a data abstraction that records an individual fact or event. For example, the fact that John Doe is an employee at the First Alien Bank is recorded by one instance of the object "Employee." The bank will probably record the same data about all its employees. An object is defined as the description of all such instances, that is, it describes the properties recorded about all employees. These properties are defined as data elements, each of which specifies a more elementary fact recorded about employees.

Objects may be as concrete or as abstract as data analysis makes them in order to represent facts or events of interest. The identification of objects is the single most important task in data base engineering, since it has an impact that reaches far beyond the scope of information systems development. The following example from the banking business illustrates this point.

Historically, the first and foremost product offered by banks was the custody of funds. The Checking Account abstraction was created as a means to keep track of relevant data. In the early days of banking, this data was maintained as a manual file that contained such elements as the current balance, the date opened, the customer's name and address, deposits, withdrawals and so on. The checking account would be a final object.

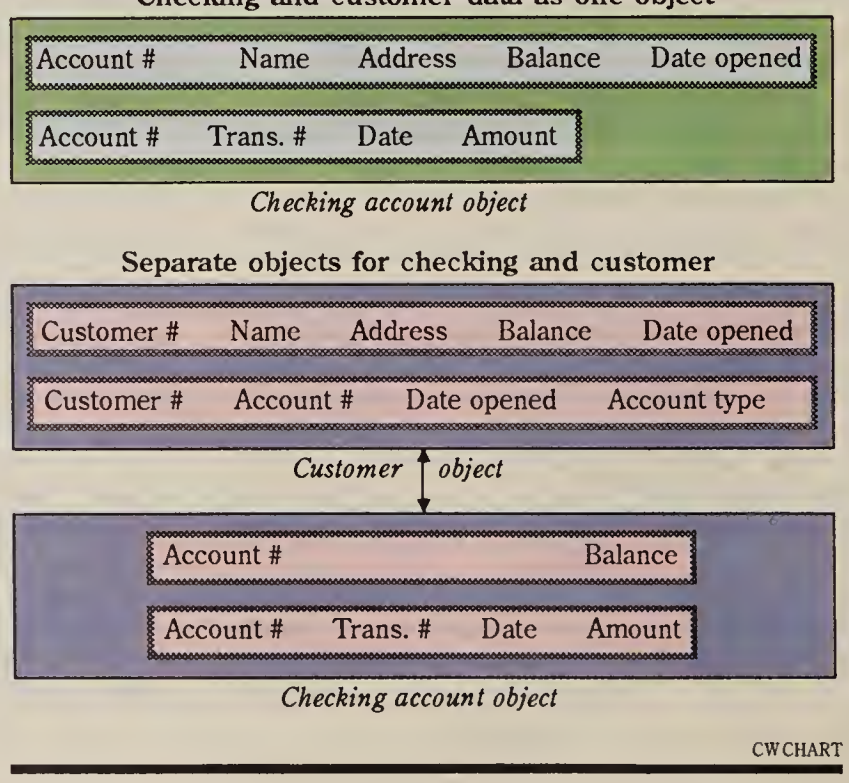
In fact, this is how most banks implemented their first computerized checking account systems — with a single sequential tape file. Even if the concepts of third normal form were applied to such a file, it could have been designed with two normalized records, one for the data elements that occurred only once and the other for the variable deposit/withdrawal transactions (see chart at left).

The problem with this approach became apparent when banks started to offer other products such as savings accounts, loans and insurance. It was further complicated by joint accounts. New objects (Savings Account, Loan Account and so on) that could not communicate with each other were created, along with large amounts of redundant data and all the associated problems.

When the banks realized they should maintain a Customer object as distinct from the Checking Account object, they found that the effort to perform this conversion was enormous. Not only did the information systems need to be redesigned, but functional units also had to be

## Data modeling

*One bank found that identifying "checking account" as an object in a data model made for an inflexible data base; keeping the customer information separate fit the business more closely*

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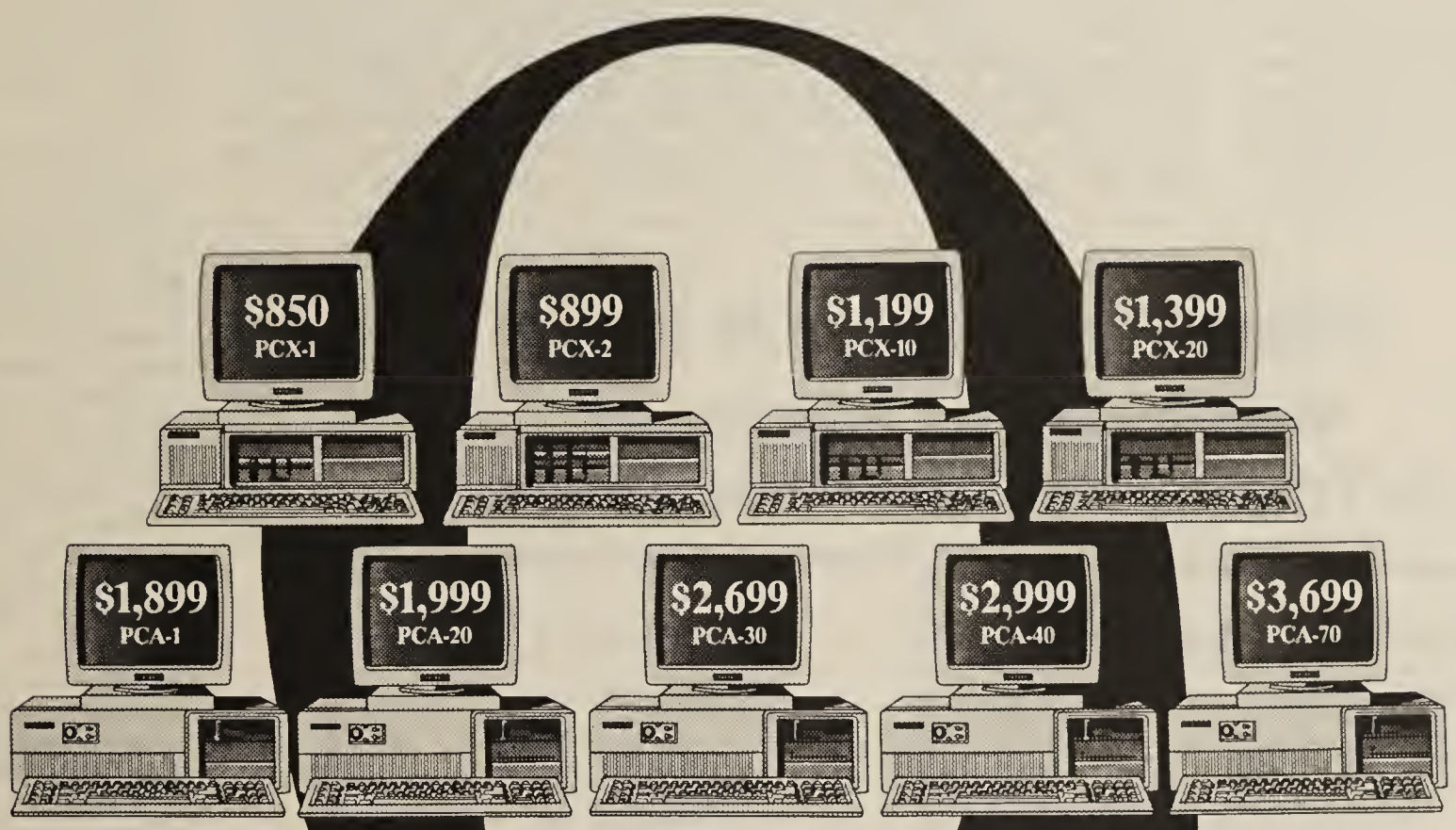


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reorganized to allow the creation of a centralized function to uniquely identify customers.

### Rules of normalization

It might be argued that the rules of normalization would separate a Customer object from a Checking Account object, but this might not always be true, depending on the existing functional dependencies among the data elements involved. If only one name and address — the account holder's — could be associated with a checking account, and no other products (such as insurance) were of interest, name and address would be functionally dependent on the Checking Account number and there would be no need for a Customer object. This was the approach taken by most banks in the past.

**AS A RESULT of the integration of the model with a new system, changes to existing models may be necessary. This can be achieved without disruption only if the boundaries between logical and physical are sharply maintained so that adjustments to logical models can be made without affecting the physical implementation.**

Ideally, new objects should be created only when the enterprise enters a new area of business and by those in charge of defining that business (the realm of enterprise engineering). However, in practice, systems analysis is often confronted with identifying objects when developing a new system for an existing business area or when documenting an existing system.

This fact/event-oriented approach to data abstractions is less ambiguous than the entity-oriented approach commonly used. The major difference between these two approaches is not in the form of representation of the model but rather in the semantic difference between objects and entities.

While entities represent things that exist in the real world, objects are more general, in that they can be any convenient data abstraction known to the business. In the entity-oriented approach, two kinds of data are defined: attributes of entities and relationships among entities. Records are created by first identifying groups of data that represent things that exist in the real world. These will constitute the entities. Then, relationships are identified and named. Some relationships, such as "many-to-many" or those containing additional attributes, also become records.

The point here is that there is no effective criteria to discriminate between those things in the real world that are entities and those that are not. For example, suppose we define Orders and Products as entities. A many-to-many relationship between these two containing the additional attribute Quantity would have to be represented as a nonentity record, which we might call a Shipment. Which intrinsic property of a Product makes it an entity, while a Shipment is seen as a relationship?

This type of ambiguity finds itself in most data bases and, further, clouds the process of entity identification. Furthermore, since different user groups may view the same real-world item either as an entity or as a relationship, an additional dimension is added to the data modelers' task — that of integrating different views into one global model.

A checking account is another example that would hardly qualify as an entity and would probably be labeled as a relationship between Customers and Transactions, unless we force the rules of entity definition.

In fact, in the entity-oriented approach, all major business events would fall into the category of relationships, which are harder to characterize, especially for users. The preceding discussion does not imply that all objects are regarded in the same way. There are many different kinds of objects, some of which, certainly, are more important than others and therefore will be dealt with at earlier phases of design.

### First things first

The point to be stressed in this discussion is that the identification of the objects to be represented in the logical data base models is not only of crucial importance to the development of information systems but can also bear on the basic operation of the business.

The rules of normalization are important for a proper design of data structures and must be strictly adhered to, but these rules can only be applied after the fundamental data abstractions — the objects — have been identified and semantically defined.

Although data management is required to have an overall understanding of all of the data, such data abstractions are not defined as a result of a caprice on data management's part. They are created by those who are most knowledgeable in that particular area of the business — the users — and systems analysts working together.

The fact/event-oriented data modeling approach leads to an easier and less-ambiguous way to create data abstractions and, most importantly, facilitates both the processes of object identification and integration. •


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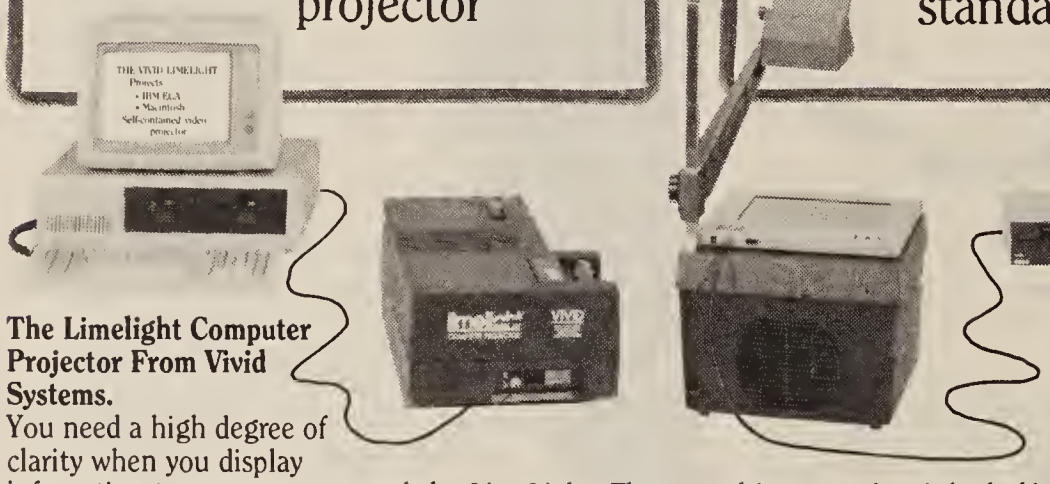

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# Putting MIS in focus

Focus means different things to different people. To a photographer, it has to do with adjusting a lens. To an astronomer, it is the sun's position in a planetary orbit. To a physician, it is where the center of an infection is located. In business, focus means choosing the most important things to concentrate on — and then concentrating on them.

Lack of focus can be disastrous. In the late 1960s there was a company called Viatron. Viatron was the prototype for the go-go high-tech start-ups of a decade later. It set out to build a terminal to rent for the then-unheard-of price of $39 per month. It was well on its way to that goal when management decided to pursue minicomputers and digital watches as well. Chapter 11 was right behind.

I have seen the difficulty of achieving focus first-hand. As director of strategic planning for a minicomputer firm, I found it easy to get agreement on the concept of focus. It was not difficult to get agreement on areas for focus. The hard part was get-

*Continued on page 64*

# GTE tries incremental backup

*Selective copying reduces risk, labor needs, storage requirements*

BY JEFFRY BEELER
CW STAFF

SACRAMENTO, Calif. — For years, the problem of how to back up mainframe disk files has created a classic bind for managers of GTE Data Services, Inc.'s computing site here.

On the one hand, the combined capacity of the data center's direct-access storage devices is growing by about 40% per year, according to GTE Senior Systems Analyst Diane Koenig. Each night, the facility has to copy the complete contents of its 99 IBM 3380s and 3380Es to its IBM 3480 cartridge-tape subsystems.

On the other hand, the window within which the site is supposed to complete the backup of its files is rapidly shrinking. "We used to start our backup at 8 or 9 p.m., when we took our on-line systems down, and were able to continue the process until about 6 a.m.," Koenig recalls.

But lately, steady growth in the company's end-user and on-line application base has forced the center to restrict its data-duplication activities to a window between midnight and 4 a.m., Koenig says.

In short, like its counterparts in many other corporations, the local GTE computing site currently finds itself burdened with more data and less time in which to back it up than ever before.

Now, however, the facility is trying to extricate itself from its growing predicament by redefining its approach to data backup. Starting last week, the data center officially became a practitioner of incremental backup.

As a result of the development, Koenig and her colleagues no longer copy the site's disk files in their entirety. Instead, they now back up only a selected subset of the contents, she says.

Included in the subset are the data sets for their IBM TSO users, production batch activities and test batch functions. In a

*Continued on page 64*

# New Fannie Mae chief stresses ease of use

BY DAVID A. LUDLUM
CW STAFF

Samuel A. Alward will have an advantage in trying to follow the increasingly widespread corporate maxim that information systems managers should keep close to their users.

As the new executive vice-president for technology at the Federal National Mortgage Association, better known as Fannie Mae, Alward is both a user and an MIS manager, overseeing mortgage administration as well as information services.

"Being a provider and user is becoming less curious in my experience. Some of the Wall Street firms are going this

**Samuel A. Alward**

route," says Alward, a former executive vice-president for finance and administration at the New York Stock Exchange.

Looking at Fannie Mae, Alward says he sees parallels with the stock exchange. "A lot of it is automated, but if we look at what can be done, it provides an exciting opportunity to make the whole thing automated," he says.

Alward describes his goal as "bringing together the different elements with the theme of making it efficient and easy to do business" with the mortgage agency.

Alward will continue the rollout of Fannie Mae's once-troubled Laser system, which mortgage lenders use to file monthly updates on the status of the loans that they have sold to Fannie Mae but continue to service.

*Continued on page 63*

# CIM may spawn new industry

BY DAVID A. LUDLUM
CW STAFF

NEW YORK — Computer-integrated manufacturing (CIM) systems may allow firms to perform manufacturing as a service for various industrial customers, an assistant secretary of the U.S. Department of Commerce told a gathering of information systems executives here recently.

Reprogrammable CIM systems might even allow such firms to offer manufacturing services to companies in different industries, said D. Bruce Merrifield, assistant secretary of commerce for productivity, technology and innovation.

Addressing a June 23 executive forum on Competitiveness Through Technology held by The Diebold Research Programs, Merrifield cited CIM as a technology that could enhance the competitiveness of U.S. industry.

**Productivity measures**

Merrifield focused his remarks on advocating an array of societal changes intended to accommodate improvements in productivity.

These changes included a comprehensive program of "computer-aided education" to improve elementary and secondary schools, new incentives for innovation — such as easier ap-

*Continued on page 63*


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## LOCAL HAPPENINGS

### JULY

**Women's Progress as Leaders: Reality or Illusion? San Francisco.** July 8, 5:30 p.m. — Contact: Association for Women in Computing, Bay Area Chapter, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

**Hewlett-Packard Toptech Users Club. Rockville, Md.** July 8, 9:00 a.m. — Contact: Bruce Baxter, Internal Revenue Service, 1111 Constitution Ave. N.W., Washington, D.C. 20224.

**Programming in Postscript** and **Rethinking Applications Design. Boston.** July 13 — Contact: The Boston Computer Society, One Center Plaza, Boston, Mass. 02108.

**Data Base Design Tailored to DB2. Philadelphia.** July 14, 9:30 a.m. — Contact: Delaware Valley DB2 Users Group, Suite 505, 3650 Silverside Road, Wilmington, Del. 19810.

**System/38 Communications Hardware, Software and Futures. Fairfield, N.J.** July 16, 3:30 p.m. — Contact: Northeast System Thirty-Eight Users, Inc., New Jersey Chapter, P.O. Box 1272, West Caldwell, N.J. 07007.

**Graphics Programming Under the OS/2 Windows Presentation Manager. Boston.** July 20 — Contact: The Boston Computer Society, One Center Plaza, Boston, Mass. 02108.

**Data Administration Management Association. Chicago.** July 21, 5:30-9 p.m. — Contact: Patricia Cupoli, Northrop Corp., Building 3555, 600 Hicks Road, Rolling Meadows, Ill. 60008.

### AUGUST

**Computer Consulting vs. Permanent Employment. San Francisco.** Aug. 5, 5:30 p.m. — Contact: Association for Women in Computing, Bay Area Chapter, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

## CALENDAR

### JULY 12-18

**Fourth Annual Information Center Conference and Exposition.** New Orleans, July 12-16 — Contact: Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

**IBM Users/DEC Users Computer Security Conferences.** Philadelphia, July 13-14 — Contact: Computer Security Institute, 360 Church St., Northboro, Mass. 01532.

**Computer-Aided Engineering: The Many Faces of CAE.** San Francisco, July 13-14 — Contact: Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

**AAAI-87, The Sixth National Conference of the American Association for Artificial Intelligence.** Seattle, July 13-15 — Contact: AAAI-87, 445 Burges Drive, Menlo Park, Calif. 94025.

**Chief Information Officer: Teaming for Profit.** New York, July 14-15 — Contact: William Smulsky, The Yankee Group, 200 Portland St., Boston, Mass. 02114.

### JULY 19-25

**AM/FM International Conference X.** Snowmass, Colo.,

*Continued on page 64*


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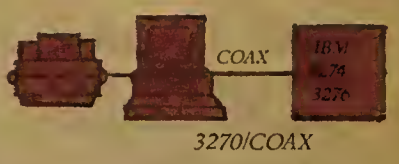

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# Fannie Mae

FROM PAGE 51

The system is replacing three older systems based on different Fannie Mae programs for buying mortgages. Lenders ship most of the updates by tape to Fannie Mae.

The Aggregate Exception System, the largest of the components that Laser is replacing, was converted to Laser Oct. 1, 1986 after a widely publicized plague of 1,500 bugs in its Cobol code delayed the start-up for 19 months and doubled Laser's estimated cost to $50 million. That component serves about 1,600 lenders, most of whom are mortgage bankers who service roughly two million loans.

Fannie Mae expects to implement the second component of Laser, replacing its Summary and Participation Reporting System, with a pilot group of about 100 lenders in September, according to Alward.

Eventually, Fannie Mae will handle about 1,300 lenders, generally thrift and savings-and-loan institutions, that service about 500,000 loans. Full-scale use is expected early next year.

The third component, replacing the Mortgage Backed Securities system, is for about 800 lenders that service about 500,000 loans. Its start-up is scheduled for the fall of 1988.

Fannie Mae also operates Mornet, a communications network for the lenders that has bulletin boards and applications that have been enhanced to allow them to edit data and deliver it to Fannie Mae via microcomputer.

"That's really exciting, because it's been a boon to small bankers. All it takes is one personal computer to talk to Fannie Mae," says Marty Mitchell, a spokeswoman for the agency.

Alward is also responsible for Fannie Mae Software Systems, a division of the association that develops and sells mortgage banking software.

Alward succeeds William A. Dawson, a former executive vice-president of Girard Bank in Philadelphia who joined Fannie Mae in February 1985, a month before the initial deadline for getting the first component of Laser running.

Dawson's drive to meet the October 1986 start-up date involved 12-hour programming shifts seven days a week. He has since resigned to pursue other career opportunities, according to Mitchell.

### Alward's mission

Alward joined Fannie Mae in November 1986 as president and chief executive of the National Mortgage Exchange Interim Corp., a division that studies the feasibility of starting an exchange for mortgage-backed securities.

"My mission was to see if there was support out in the market for that," Alward says. "With other initiatives going on, another entry probably didn't make good sense. I recommended we not proceed."

Previously, Alward was vice-president for Seaboard Coastline Railroad and president of its computer services subsidiary, Cybernetics & Systems, Inc. He graduated from the U.S. Military Academy in West Point, N.Y., and was a marketing manager for IBM.

# CIM

FROM PAGE 51

proval of patents for defense-related inventions — and greater use of cooperative research and development programs.

Merrifield also advocated several steps intended to remove barriers to American competitiveness, such as relaxing the 73-year-old Clayton Antitrust Act, loosening industrial regulations and lowering the cost of capital.

He justified such moves on the basis of the global competition facing U.S. industry.

"If it's pro-competition in the global context, it's OK," Merrifield said. "It's going to happen with us or without us. It better be with us."

Merrifield also noted that the U.S. has advantages in competing globally, including the country's advanced technology, industrial infrastructure, wealth of capital and entrepreneurial culture.


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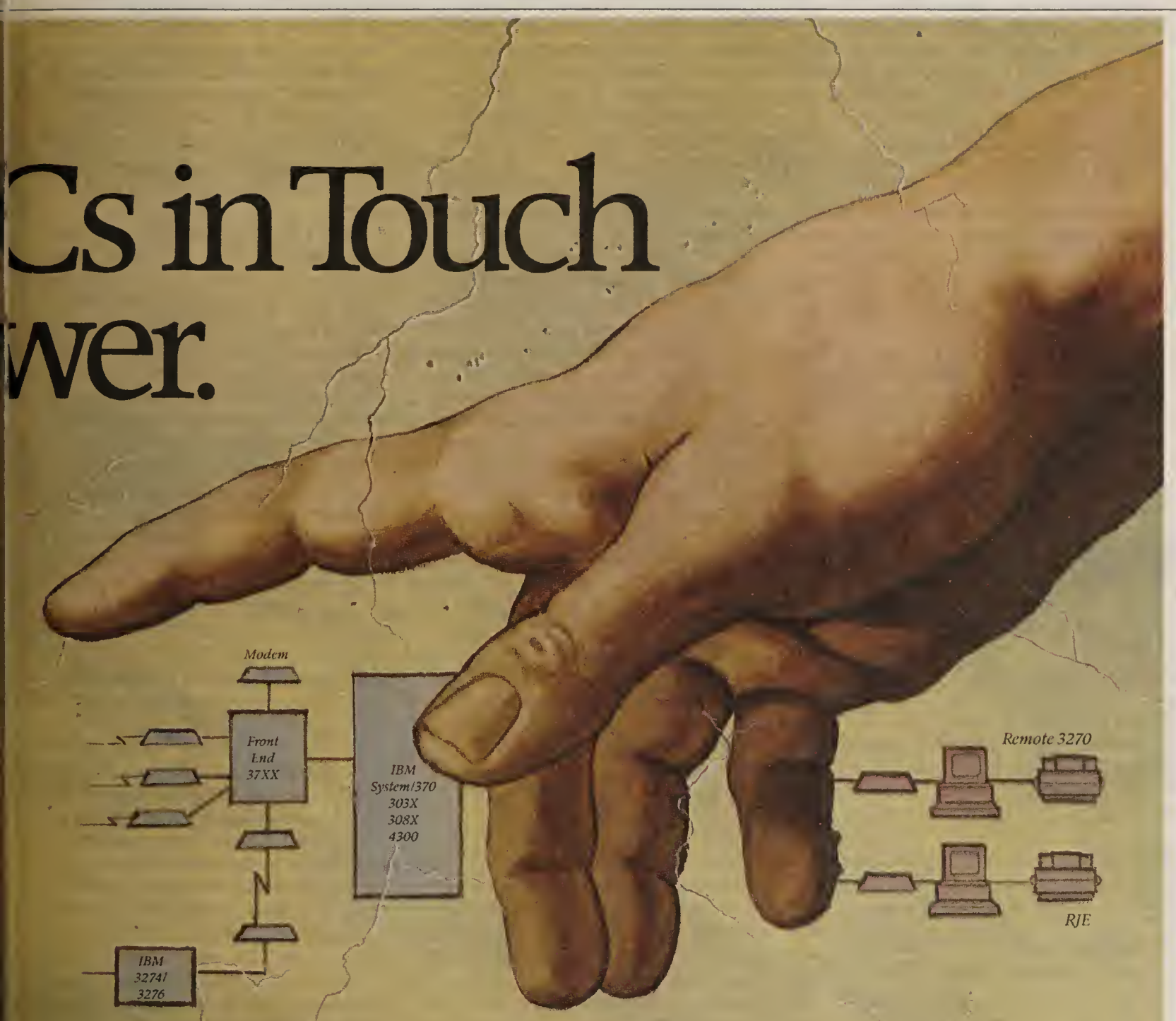


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*Continued from page 62*
July 20-23 — Contact: Barbara Emery, Automated Mapping/Facilities Management International, Suite 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

**The Federal Desktop Publishing Conference and Product Showcase.** Washington, D.C., July 20-23 — Contact: FDPC coordinator, 3825-I S. George Mason Drive, Falls Church, Va. 22041.

**The Desktop Publishing Conference.** Arlington, Va., July 21-22 — Contact: The JLS Group, Inc., 7485 Demille Court, Annandale, Va. 22003.

**National Fincom: Financial and Computer Automation Conference.** New York, July 22-23 — Contact: Jim Mion, H. A. Bruno, Inc., 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

**Microtrends '87.** New York, July 22-24 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

## JULY 26-AUG. 1

**Computer Associates International, Inc. Annual User Conference.** Orlando, Fla., July 26-31 — Contact: Barbara Peacock, Computer Associates, 711 Stewart Ave., Garden City, N.Y. 11530.

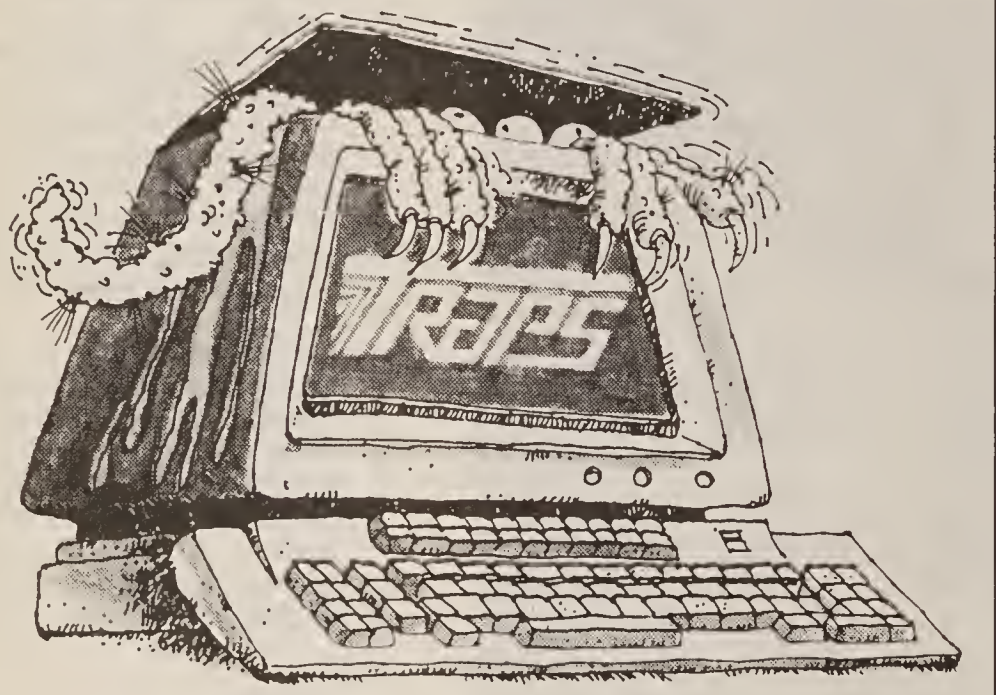
**1987 Summer Computer Simulation Conference.** Montreal, July 27-30 — Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

**Siggraph '87 — The Fourteenth Annual Conference on Computer Graphics and Interactive Techniques.** Anaheim, Calif., July 27-31 — Contact: Siggraph '87, Conference Management, Smith Bucklin and Associates, Inc., Suite 600, 111 E. Wacker Drive, Chicago, Ill. 60601.

## AUG. 2-8

**Annual Remittance and Document Processing Forum.** San Francisco, Aug. 2-5 — Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

**25th Annual Conference of the Urban and Regional Information Systems Association.** Fort Lauderdale, Fla., Aug. 2-6 — Contact: URISA, 319 C St. S.E., Washington, D.C. 20003.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# MIS in focus

CONTINUED FROM PAGE 51

ting people who saw themselves "losing" to give up their pet projects. They would bring in a sales representative to promise a 600-system order if we did *X*. Of course, nobody ever ordered 600 systems, even when we pulled out all the stops. The order went to a firm that had been doing *X* for years, had made it the corporate focus and finally had it right.

Focus isn't just for computer manufacturers. It's just as important for MIS executives. Nobody can be all things to all people. One can choose to do a few things well or many things poorly. In 99 of 100 cases, doing a few things well is better for all concerned.

That's nice in theory, but how do you choose the few things that are worth doing well?

### Using CSFs to your advantage

One way is via critical success factors, or CSFs. CSFs were first put forth publicly in a 1979 *Harvard Business Review* article by John Rockart. The basic CSF concept is simple, almost trivial: Figure out the most important measures of success, figure out what you have to do to succeed by those measures and focus on them. If CSFs have been properly defined, proper priorities will follow.

The hard part is defining CSFs properly. One may have 100 current applications, any of which would cause a crisis if it broke. Does this mean the MIS head should worry about all 100? Of course not. A shop big enough to have 100 critical applications has more than one manager. Put Harry in charge of applications. Then the MIS head has one CSF in this area — making sure Harry does his job.

As Jerry Kanter and Richard Dooley pointed out in a 1986 Babson College study, this may call for fewer direct reports to the MIS head. While this reduction must not create too many management levels, it may be the only way a chief information officer can focus fully on what is truly important.

### This year's critical issues

The real CSFs for most MIS heads this year relate to the organization's business. They have to do with making a contribution to the business by increasing its competitiveness, responsiveness and product quality; by decreasing its capital investment needs in manufacturing and distribution; and by enabling its executives to make better and faster decisions.

They include keeping MIS staffers happy and productive. They reflect concern for control, audit, stability and maintenance of on-going applications, some of which are mundane.

The specifics vary with each organization: its industry, culture, strengths, weaknesses and the position of its top information systems executive. But CSFs exist in every case.

MIS chiefs should ask themselves, "What are my critical success factors? What can I do, in my job, to make a contribution to this organization?" Having done so, they must translate these needs into personal CSFs. The result will be good for both the employee and the employer.

Mallach is associate professor of computer science at the Boston College School of Management.

# GTE

CONTINUED FROM PAGE 51

nutshell, "we're now backing up only those data sets that change," Koenig says.

Under the full-volume backup procedure the data center used previously, "we clearly had a problem, and incremental backup was the vehicle we chose to solve it," says GTE Associate Systems Programmer Mike Mathis.

The shift in GTE's computing site backup strategy coincides with its conversion from Cambridge Data Systems, Inc.'s ASM2 to IBM's Data Facility Hierarchical Storage Manager, which went into production at the facility on June 29. The IBM data storage manager is the software mechanism that makes the selective copying of GTE's data sets possible.

Previously, the data center used ASM2, an automated storage manager, to migrate its disk files to a Masstor Systems Corp. M860 mass-storage unit. But whether the GTE location here will continue to use the M860 for archival storage purposes remains to be seen.

### Evaluating storage systems

The site is currently testing both the mass-storage subsystem and the 3480 for their suitability as data-migration media. Completion of the testing is set for mid-August, Koenig says.

Prior to switching from full-volume to incremental backup, GTE says it sometimes found itself unable to duplicate all its direct-access storage files to tape within the allotted window of time. The result was that the computing site was occasionally forced to conduct the next day's processing activities with only one copy of some of its key data sets. If a disaster had befallen its master disk packs, critical data might have been irretrievably lost.

Thanks to good fortune thus far, the lapses in the company's backup procedures never coincided with any serious accidents. "But we definitely had some exposures," Mathis recalls.

Now that it has converted to incremental backup, the firm no longer faces the danger of having to operate with only one copy of its key data. The reason is that the change in backup techniques has greatly cut the amount of data the organization has to duplicate at night and thus has virtually guaranteed its ability to finish the task on time.

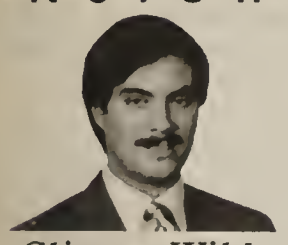
### Cuts costs, work load

In embracing incremental backup, GTE also expects to be able to cut the number of tapes it has to mount during the evening by 80%, Koenig says. Previously, the data center averaged 200 to 300 tape mounts per night.

The reduction in tape mounting requirements, in turn, promises to help the computing facility trim its personnel costs, which are already "very high and are rapidly rising," Koenig says.

Another benefit of selectively backing up data is that the tactic will shrink to 2,000 the number of tape cartridges the site has to maintain to copy its critical files, she adds. In the past, the processing center's tape library typically contained about 9,000 such cartridges.

INDUSTRY INSIGHT



*Clinton Wilder*

# Catching up with the past

Like baseball's All-Star break, the three-day Fourth of July weekend provides an appropriate midpoint to look back on events of the first half of the computer industry's 1987 season. Hopefully, a recap and assessment of some of the major developments in the first six months will help prepare us for what may be in store in the second half. But of course, in this business, you never know.

**When the shark bites. . .** The biggest industry event of the year so far has been Computer Associates International, Inc.'s surprise acquisition of Uccel Corp. Standing the independent software industry on its ear during the week of Comdex/Spring '87, the brothers Wang vaulted their fast-growing firm to the top of the size list. If the $800 million deal is approved later this summer, Computer Associates could arguably become the industry's first software conglomerate.

Is this good or bad for users? Opinions vary widely, and only time will tell how well Computer Associates lives up to its promises of continued product support and upgrades. But one certainly cannot charge that the Garden City, N.Y., software mansion has no experience in digesting acquired companies.

From a business standpoint, however, the software industry suffers when one of its best success stories of the past two years disappears under the wing of a larger partner. Uccel's Chief Executive Officer Gregory Liemandt had done a superb job of refocusing the Dallas vendor with a savvy combination of sell-offs and buy-outs; even Wall Street was impressed. While Liemandt and his colleagues obviously reaped handsome financial rewards from the buy-out, the industry itself, in losing a strong independent player, is poorer for it.

**P.S. Do I love you?** At least three entire industries — microcomputers, add-on pe-

*Continued on page 67*

# More mergers in networking industry

## *DCA to purchase LAN manufacturer Fox Research*

BY ELISABETH HORWITT
CW STAFF

ALPHARETTA, Ga. — As part of its strategic direction of offering a complete communications product line, Digital Communications Associates, Inc. (DCA) agreed last week to acquire local-area network (LAN) company Fox Research, Inc., a subsidiary of Fox Technology, for $10 million in cash and debt assumption.

Fox's "entry level-oriented LAN" would strengthen DCA's ability to meet the needs of "independent end users who are not necessarily attached to a corporate host," said William Hiller, DCA director of communications systems. Whereas DCA's flagship product line, the Irma micro-to-mainframe board, "provides host-data access and involves day-to-day MIS support," the company is now concentrating on end user-to-end user communications products, he explained. The acquisition of micro communications software company Microstuf, Inc. last year was another move in that direction. DCA is also internally developing products "geared to linking remote end-user locations with no mainframe host," Hiller said.

DCA has no plans to integrate its Irma line with Fox's 10-Net family of IBM Personal Computer LAN products, Hiller said. This departs from a precedent set by LAN vendors Unger-

*Continued on page 67*

## *Micom to acquire Spectrum for $25M*

BY JAMES A. MARTIN
CW STAFF

SIMI VALLEY, Calif. — Micom Systems, Inc. said last week it plans to acquire Spectrum Digital Corp., a T1 multiplexer vendor, for a total of $25 million in cash and stock.

The merger will bring greater T1 capabilities to Micom and will give Spectrum Digital the resources of a larger company to strengthen its presence in the hotly competitive T1 market, officials said. Spectrum Digital, based in Herndon, Va., will be operated as an independent subsidiary of Micom.

"The merger removes a cloud that any small high-tech company has about their financial viability," said Joseph T. Pisula, Spectrum Digital's president. "Many large customers hesitate to do business with smaller companies for that reason."

That type of consolidation has been exemplified by several recent deals in which larger companies acquired T1 technology from smaller T1 vendors.

Among these were Digital Communications Associates, Inc.'s acquisition of Cohesive Network Corp. and IBM's OEM agreement with Network Equipment Technologies Corp.

**Expands network products**

Micom, like many data communications equipment makers, is seeking to expand its networking product offerings through acquisitions. In 1985, Micom acquired Interlan, Inc., a local-area network maker based in Boxboro, Mass.

Industry observers said they believe the Spectrum Digital acquisition will have little impact on the two companies' products. Spectrum Digital and Micom previously had an OEM agreement under which Micom repackaged and resold Spectrum Digital products.

Micom's acquisition of Spectrum Digital is a good move but belated, according to Phil Litwin, an analyst with L. F. Rothschild, Unterberg Towbin.

"The T1 market is still strong, but they've missed a lot of its growth already," Litwin said. "In addition, Spectrum Digital doesn't have a large market presence, and Micom's range of T1 multiplexer products is still not as broad as that of some competitors."

Paradyne Corp., a Micom competitor in certain markets, also has an OEM agreement with Spectrum Digital, although none of the companies involved believe this will create conflict.

"We have exclusive manufacturing rights to the T1 multiplexer in the U.S. and nonexclusive distribution rights," said Ron Stein, manager of telecommunications marketing for Paradyne in Largo, Fla.

"We have always had a good relationship with Micom, so I don't see any effects from the merger," he added.

**Inside**


- Concurrent restructures and lays off 2% of its domestic work force. Page 66.
- Maxtor buys data storage subsystem distributor Storage Dimensions. Page 66.


# IBM's new European unit goal: PBX market

BY AMIEL KORNEL
IDG NEWS SERVICE

PARIS — In a move designed to help hawk its telecommunications wares in Europe, IBM recently announced the creation of a unit to develop and manufacture voice- and data-switching systems adapted to the European market.

Called Integrated Services Switching Systems (ISSS), the organization will be based in the England at IBM UK Holdings Ltd.'s Havant facility, according to the company, and will be headed by Frank Onians, currently a vice-president of IBM-owned Rolm Corp.

"ISSS will concern the Europeanization of products from Rolm," explained a spokesman for IBM Europe in Paris. "Up to now, there have been no switching systems of Rolm effectively up for sale in Europe."

Equipment destined to be linked to the public networks in Europe requires official approval from the government-controlled telecommunications authorities. ISSS will implement the neces-

*Continued on page 67*

# IPL recovers with memory products

BY ALAN J. RYAN
CW STAFF

WALTHAM, Mass. — After being squeezed out of the plug-compatible mainframe market by mammoth IBM, a new focus and new products have helped bring some life back to once-dying IPL Systems, Inc.

The company, now marketing memory products for the IBM System/36 Model D and System/38 minicomputers, has reported six consecutive profitable quarters.

However, while its figures are back in the black, many of IPL's profits still stem from the IBM 4300-compatible CPU product line; the company is trying to move beyond this niche.

IPL aims to soon be 100% dependent on sales and earnings from the memory products, but of the $1.09 million reported in sales last quarter, approximately $750,000 came from the sale of CPUs, according to President and Chief Executive Officer Robert W. Norton. "Even though we are not currently investing any money into the mainframe business, we continue to sell mainframe computers on an OEM basis," Norton says.

Norton says the company's mainframe business will likely end in mid-1988 with the expiration of a major federal government contract with one of IPL's OEM customers, which is widely believed to be AT&T. A second OEM customer for IPL is Masstor Systems, Inc.

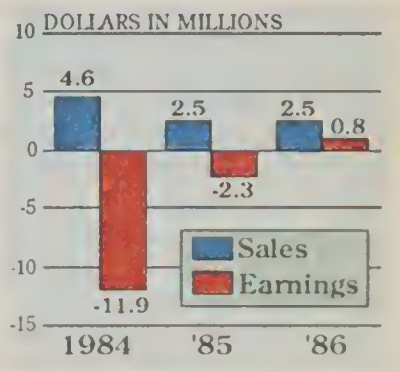
Also aiding in IPL's return to profitability has been a massive work force reduction of more than 75% of the firm's employees. In the early 1980s, some 260 names made up the employee roster. The company had two sites and sales of $16 million annually. Then things went downhill, and the layoffs started.

IPL was founded in 1973 by current Chairman Stephen Ippolito, who had previously worked at Cambridge Memories, Inc., also in Waltham. IPL achieved some of its early success selling

*Continued on page 69*

**IPL's bumpy road**

*After hitting rock bottom, IPL is climbing back; the firm reported a $419,000 profit on $1.1 million in sales in this year's first quarter*




INFORMATION PROVIDED BY IPL SYSTEMS, INC
CW CHART

# Concurrent restructures, slims staff

BY ALAN ALPER
CW STAFF

HOLMDEL, N. J. — Concurrent Computer Corp. last week laid off approximately 2% of its domestic work force as part of a modest restructuring of its corporate resources.

The layoffs cut across the firm's 1,650 Monmouth County, N.J.-based work force, according to a company spokesman, affecting employees in marketing, service and administration. The minicomputer maker also said that it is consolidating its nine New Jersey locations into three facilities.

Concurrent's service operation, which was dispersed throughout several facilities, will now be located with manufacturing at its Ocean Port facility. The firm is also moving its corporate administration staff from Holmdel to Tinton Falls, where sales and marketing are located. The consolidation is expected to be completed during the next six months, the spokesman said.

In a related move, the firm named Joseph Rechner, its vice-president of customer service, to the newly created position of vice-president of operations. Rechner is responsible for customer service and manufacturing in his new post.

The moves come as Concurrent attempts to rebound from a soft economy that has affected demand for its and other minicomputer companies' products. Although Concurrent earned $2.4 million in the third quarter, compared with a $724,000 loss in the comparable period last year, its nine-month results reflect the sluggish times. Concurrent earned $4.6 million during the last nine months, off 5% from the same period last year.

# DEC settles DSI copyright suit

BY CLINTON WILDER
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp. won an out-of-court victory last week over a Lanham, Md.-based third-party maintenance firm that allegedly used unlicensed diagnostic software from DEC to service VAX minicomputers.

DEC agreed to drop its 1986 copyright infringement lawsuit against DSI Computer Services, Inc. [CW, Nov. 18, 1986] and received an undisclosed cash payment from DSI. According to DEC, DSI admitted its unlicensed use of the software. In addition, DSI assured DEC that it is not currently using the software in question and will not do so in the future.

When the suit was filed, DSI had characterized it as a "DEC sales tactic" to discredit DSI in the eyes of its third-party VAX maintenance customers, which are primarily federal government accounts. But DEC viewed the matter strictly as a case of copyright protection.

# Maxtor purchase steps up move on PC market

BY JAMES A. MARTIN
CW STAFF

SAN JOSE, Calif. — Maxtor Corp. said last week it has acquired Storage Dimensions, Inc., a data storage subsystem distributor in the IBM Personal Computer market, for an undisclosed amount.

The acquisition "reflects Maxtor's commitment to compete actively in the high-capacity segment of the PC marketplace, which involves applications tools and distribution channels that differ from Maxtor's traditional OEM business," a Maxtor spokesman said.

Storage Dimensions, based in Los Gatos, Calif., is a privately held company that purchases Maxtor's 5¼-in. Winchester and optical disk drives. It incorporates the drives, along with its own operating system utility software, into its family of data storage subsystems for distribution to value-added channels.

### Independent subsidiary

Storage Dimensions reportedly is to be included in Maxtor's Storage Systems Group, which includes U.S. Design Corp., a firm Maxtor acquired two months ago. Both companies will be operated as independent subsidiaries, Maxtor said.

Analysts viewed Maxtor's recent acquisitions as a positive move for the firm. "Maxtor's been getting closer to its end users and their applications, and this is just another step in that direction," said Jim Moore, a storage analyst for Dataquest, Inc. in San Jose, Calif.

The strategy behind the acquisition was to open up new avenues for distribution, not to create new products, the company said.

"A key element in our strategy is using our existing channels of distribution while further expanding our distribution through our subsidiaries," said Bob Teal, Maxtor's senior vice-president of marketing.

# IBM's unit goal

CONTINUED FROM PAGE 65

sary design changes of telecommunications equipment manufactured in the U.S. so that it meets European requirements, the spokesman said.

### Effective resource allocation

"This move will enable IBM to focus its telecommunications development and manufacturing resources more effectively on the European marketplace," asserted Michael Armstrong, president and director general of IBM Europe, in a prepared statement.

IBM indicated in September 1986 that a reorganization of its European operations at that time was partly motivated by a will to improve its European telecommunications business.

IBM already sells its 1750 model analog private branch exchange in five European countries. In addition, Rolm provides British users with its Automatic Call Distributor, which is used for distributing a high volume of incoming calls to agents, such as for ticket reservations.

### Looking to the future

Observers noted that the ISSS emphasis on developing products integrating voice and data that can be connected to Europe's public networks will permit IBM to target the future market for Integrated Services Digital Networks (ISDN).

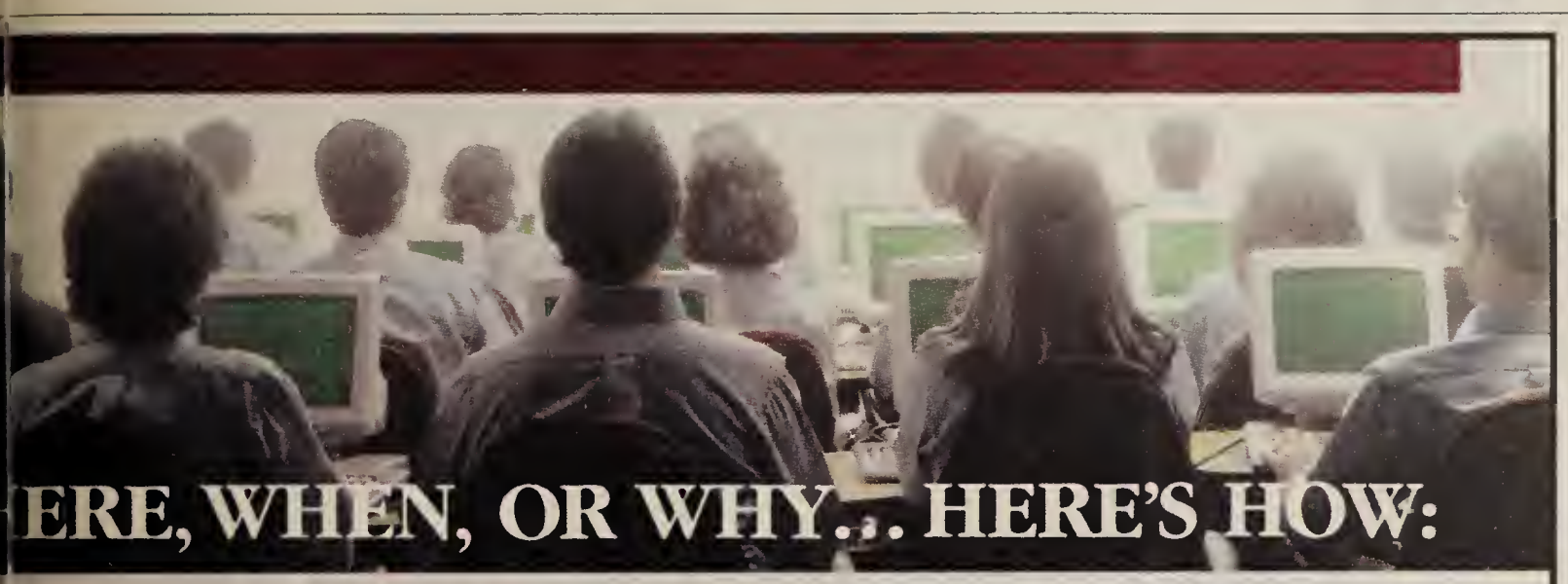
ISDN is being championed by several European telecommunications authorities, with major pilot projects under way in France and West Germany.

Separately, IBM announced plans last week to create a value-added network services venture in France sometime this summer.

The firm is to be owned jointly by two French banking groups, Paribas and Credit Agricole, and a French software and services company named Sema Metra.

With the launch, IBM scores a major victory in its efforts to penetrate the European value-added network services market.

The consortium has been awaiting government approval of the project since February 1986.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# Catching up

CONTINUED FROM PAGE 65

ripheral vendors and micro software — will be sorting out the potential damage/market opportunities of the IBM Personal System/2 for months to come.

In peripherals, an industry already littered with ailing players will certainly shake out further. In micro software, the inevitable evolution of the Big Three into mainframe territory will be hastened. Among the clone makers, there will be plenty of market opportunity for the swift and the smart — but beware the mighty Blue legal force. Compaq Computer Corp.'s Rod Canion will find out if there is a *Business Week* cover jinx.

**Workstation warfare.** With the heavy artillery of price cuts and MIPS ratings, the battle rages. What else would one expect in an area that covers Unix, computer-aided software engineering, computer-integrated manufacturing, expert systems development and networking? The guys to watch carefully are in Maynard, Mass. — this could be the market that keeps Digital Equipment Corp. riding high.

**Raging bulls.** With the Dow Jones industrial average roaring again and the shine returning to high tech in the investment world, initial public offerings are back in vogue. From minisupercomputers to desktop publishing software, dozens of vendors took the public plunge in the first half of the year. Even microcomputer retail chains are getting into the act. So where is that recession those economists have been predicting?

Wilder is *Computerworld's* senior editor, computer industry.

# DCA

CONTINUED FROM PAGE 65

mann-Bass, Inc. and Novell, Inc., which acquired micro-to-mainframe companies during the past couple of years.

Earlier this year, Ungermann-Bass announced a network gateway that supports micro-to-mainframe software from its wholly owned subsidiary, Linkware Corp. And Novell announced at Comdex/Spring '87 that its subsidiary CXI, Inc.'s terminal emulation software now supports Novell's Netware.

Fox Research, a Dayton, Ohio, company with 1986 revenue of approximately $6.8 million, is the latest in a series of acquisitions by DCA. DCA made three acquisitions in 1986: Forte Communications, Inc., one of its competitors in the IBM PC terminal emulation board market, T1 switch vendor Cohesive Network Corp. and Microstuf.

While Fox has concentrated on the international market, "avoiding the national market which has been dominated by the 3Com Corp.-Novell battle," DCA hopes to boost 10-Net sales in the U.S. through its own distribution channels, Hiller said.

The agreement between DCA and Fox calls for the payment of cash and the assumption of liabilities of approximately $10 million by DCA with a contingent "earn-out" of up to an additional $6.5 million. The latter provision is based on the future financial performance of the Fox Research Division of DCA during the one-year period following the closing.

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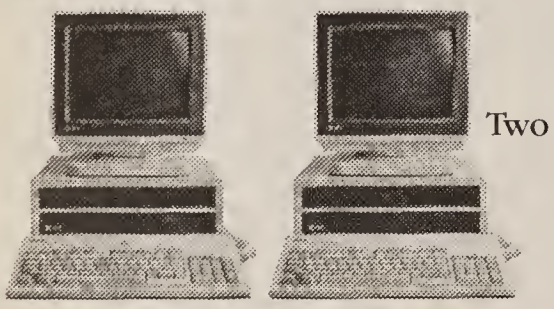

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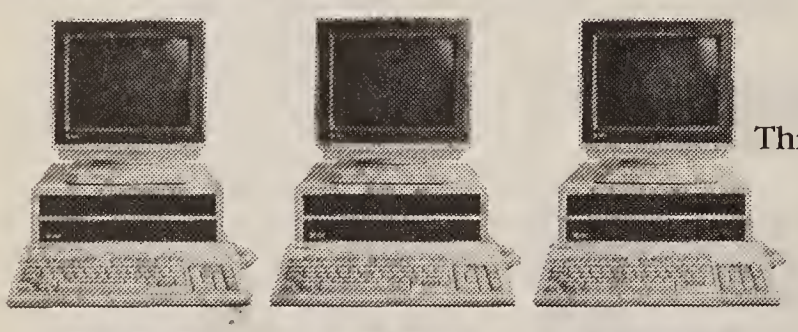

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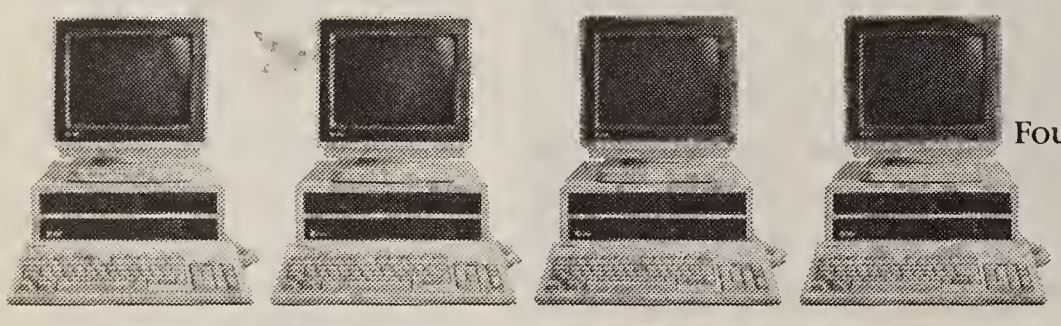

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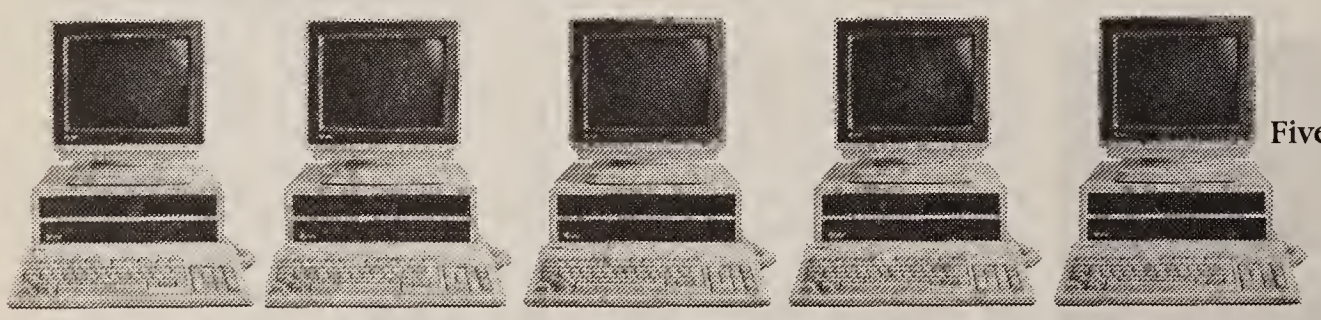

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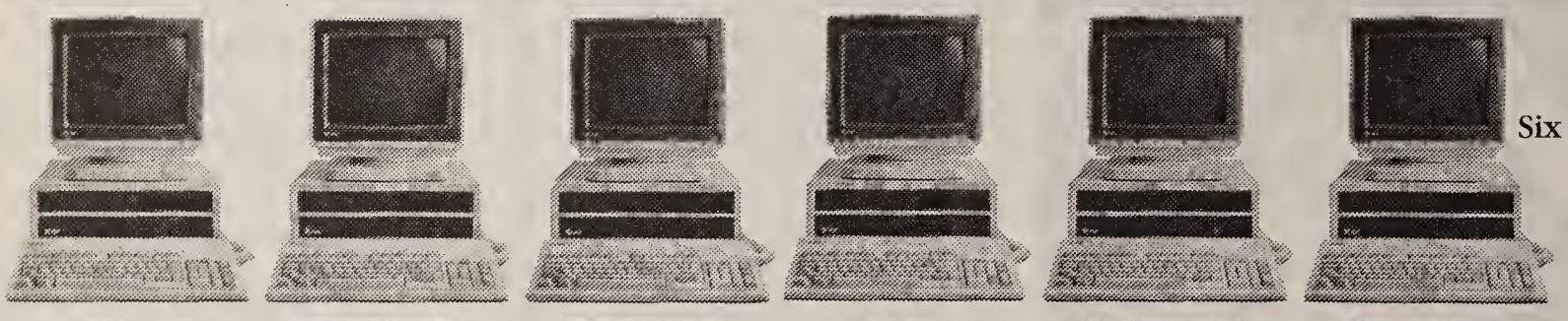

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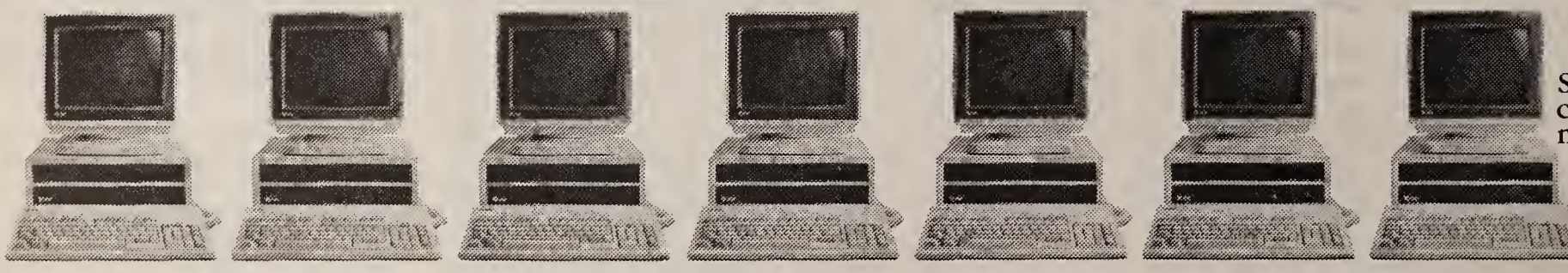

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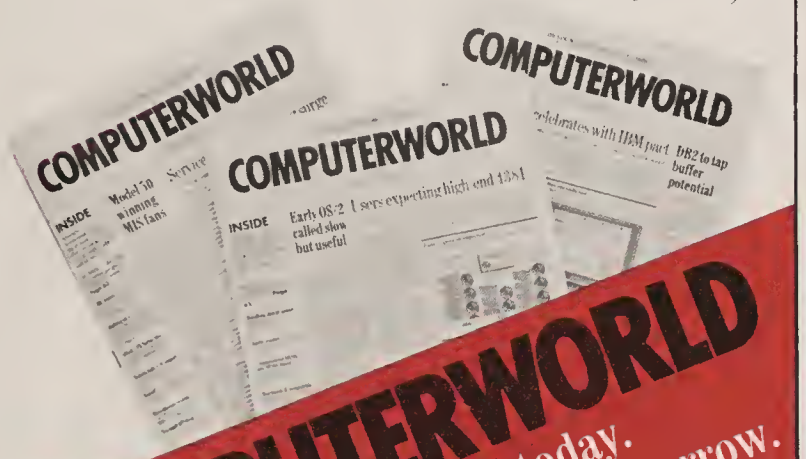

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# IPL

CONTINUED FROM PAGE 65

to Control Data Corp., which funded IPL's start-up to provide IBM plug-compatible CPUs after Cambridge Memories closed its doors.

But the hard times hit in recent years. In 1983, IPL reported a loss of $4.25 million on sales of $9.9 million. The following year, the company lost $11.9 million on sales of just $4.6 million. In 1985, the firm reported earnings of $385,000 in its fourth quarter but lost $2.3 million for the year on sales of $2.5 million.

Today, the company's remaining 24 employees have much excess space in IPL's 55,000-square-foot facility, which is located in an industrial park in Waltham, a city west of Boston.

### On the upswing

The current workers are leading IPL in its new direction, and for now, the strategy seems to be working. IPL returned to the black in 1986, earning $800,000 on sales of $2.5 million. In its first quarter of fiscal 1987, IPL reported modest net profits of $419,000, or 8 cents per share — a 38% increase over the previous year's first-quarter results. Some $255,000 of first-quarter sales were from the memory products, a 180% increase over the preceding quarter.

"Our plan is: As the mainframe revenues phase out as expected, the revenue from the new products will phase in and take over," Norton says. "That presents a very severe short-term management problem to make sure that the transition is done effectively."

To sell its product line, IPL goes through the dealer, broker and value-added reseller channels and also conducts telemarketing. The company maintains no outside sales force. IPL does have in-house manufacturing for the CPUs but subcontracts the memory products to an outside manufacturing house. "You don't have to go through the pain of dismissing people if business has a negative trend, nor do you have the possibility of being stuck with a large amount of real estate that you can't use because of a downward trend in the business," Norton says of the outside manufacturing.

On the positive side, he adds, the outside manufacturers can more easily accommodate a spike in production needs.

IPL plans to use its memory products to gain name recognition in the new marketplace before branching out to other IBM-compatible peripheral products, the CEO says.

Norton says he remains optimistic about the company's future success and that the price/performance of the memory products will keep IPL in business. He says IPL can provide the memory for the System/38 at a 50% savings over IBM's pricing. "We have a unique design that allows us to keep the cost very low, but the storage of data is identical to the way IBM and other developers do it," he says.

Armed with a heavy reminder of the company's past, the IPL president is humble. "We haven't lost sight of the big job in front of us," Norton says. "If you go into a new marketplace, you have to convince the customer that the organization he's dealing with is going to be around for a long time to provide service and support to the product. If you try to do that with red ink on your financials, the customer would just stay away from you."

## EXECUTIVE CORNER

The board of directors of **Hogan Systems, Inc.** recently announced a series of organizational changes.

**George L. McTavish**, president and chief executive officer, assumed the role of CEO and chairman of the board. McTavish succeeds **Gregor G. Peterson.**

Peterson remains a director of the company.

**Richard B. Aldridge**, executive vice-president, was named president and chief operating officer. **Patric J. Jerge** was promoted to senior vice-president of field operations and will report directly to Aldridge. Hogan also announced that **James J. Murphy** has joined the company as senior vice-president in the community banking group. Prior to joining Hogan Systems, Murphy spent 24 years with IBM.

**Mitel Corp.** announced that President and CEO **Anthony F. Griffiths** will become chairman of the company. **David Golden**, the current chairman, will remain as a director of Mitel and chairman of two of its subsidiaries, Mitel Datacom and Trillium Telephones Systems, Inc.

**Bert Novak** has been appointed to the post of president of the **McDonnell Douglas Field Service Co.** Novak had been director of quality assurance and technical support for Cupertino, Calif.-based McDonnell Douglas Network Systems Co., which operates the Tymnet worldwide public and private telecommunications networks.

**Mentor Graphics Corp.** Chairman and CEO **Thomas Bruggere** announced the appointments of **Gerard Langeler** as president and chief operating officer and **David Moffenbeier** as executive vice-president. Langeler was previously executive vice-president and chief operating officer.

## NICKELS & DIMES

**Floating Point Systems, Inc.** announced revenue for the second quarter ended April 30 of $23.5 million, compared with $21.3 million the previous year. The company also reported a net loss of $2.1 million, or 24 cents per share, compared with a net loss of $1.5 million, or 18 cents per share, in the like period a year earlier.

**American Software, Inc.** announced revenue for the year ended April 30 of $46.7 million, up 22% from the $38.3 million reported last year. Profits were $8.8 million, or 85 cents per share, compared with $5.9 million, or 59 cents per share, in the comparable period a year ago.

Revenue for the fourth quarter was $12.8 million, compared with $10.3 million the previous year. Profits were $2.1 million, or 20 cents per share, compared with $1.9 million, or 18 cents per share, in the comparable period a year ago.

**Gandalf Technologies, Inc.** reported revenue for the third quarter ended May 2 of $33 million, compared with $28.2 million one year ago. Profits were $1.7 million, or 16 cents per share, a 74% increase from the $962,000, or 10 cents per share, in the like period last year.

**PC's Limited/Dell Computer Corp.** announced record results for the first quarter of its 1988 fiscal year. The company earned $1.9 million on net sales of $33.4 million in the quarter ended April 30. This compares with net earnings of $2.2 million and net sales of $69.4 million for the full fiscal year ended Jan. 31.

As a percentage of sales, net earnings were 5.8% for the first quarter of 1988, compared with 3.1% for fiscal 1987.


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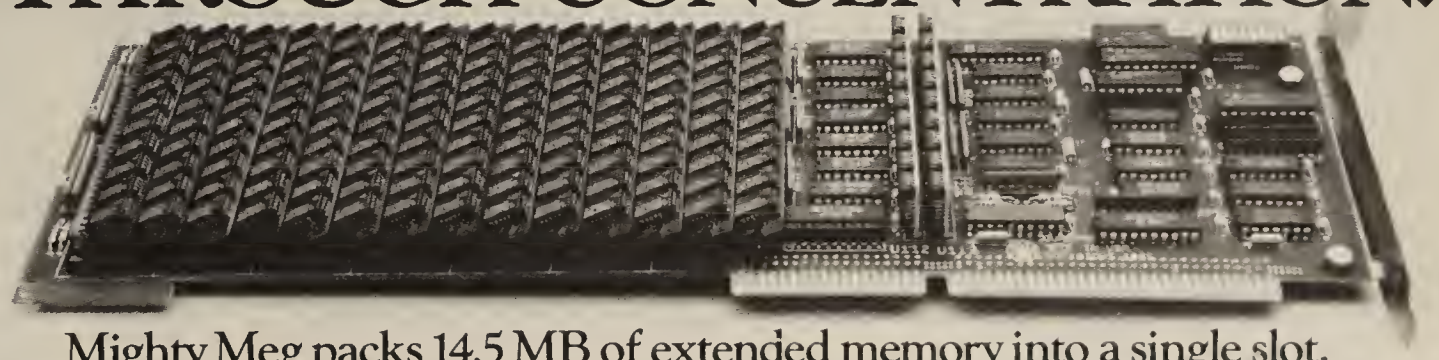

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# Good managers are hard to find

*Manufacturers seek MIS directors, senior-level programmer/analysts*

BY DALE F. FARMER
SPECIAL TO CW

With the advent of computer-aided design and manufacturing (CAD/CAM), manufacturing resource planning and robotics, manufacturers are rivaling service industry companies in their implementation of automation. Data processing professionals, especially those with manufacturing experience, are finding more opportunities in this environment.

In 1982, service industry companies accounted for 71% of total U.S. DP hiring, according to Dunhill Personnel Systems, Inc. That figure dropped to 64% in 1986. Manufacturers accounted for 29% of the DP hiring in 1982 and 35% in 1986, the firm says.

The DP environment in manufacturing companies offers unique opportunities and challenges. Professionals hired by companies just starting to automate face the challenge of developing a system that is acceptable to the line personnel. They must overcome objections from current employees who want to maintain the status quo. They must handle criticism of the new system diplomatically and present the advantages provided by automation.

Besides the drive to automate, the growth of many manufacturing organizations is creating openings in senior and management-level DP positions. Candidates for these levels must possess a good performance record and be willing to adapt to a new environment. Two manufacturing companies may make similar products, but their manufacturing processes will differ. In some cases, the processes may differ within a single company that makes the same product in various locations.

DP goals in manufacturing differ from those of DP in service companies. In banking, insurance or retail, for example, DP professionals must be concerned with providing information or answers to customers. In manufacturing, they must use technology to create an actual product that can be sold. This distinction is small, since both groups are concerned with satisfying a customer's needs. However, manufacturing managers focus more on cost control, efficiency and accuracy in getting the product out the door and into the customer's hands.

"You're constantly being pushed, because making the product makes the dollars," says Henry Buckland, DP manager for Rowe Furniture Corp. in Salem, Va. "There is a lot of pressure, because nothing must impact the manufacturing process. You have to be responsive to any type of crisis which may require an immediate response."

Such crises can be as simple as the breakdown of a conveyor belt or as complex as the breakdown of labor negotiations.

Because few DP professionals understand manufacturing processes, many companies find locating the right candidate for senior-level positions difficult. Experienced candidates are hardest to find for the positions of senior programmer/analyst, data base manager and MIS director, manufacturers say.

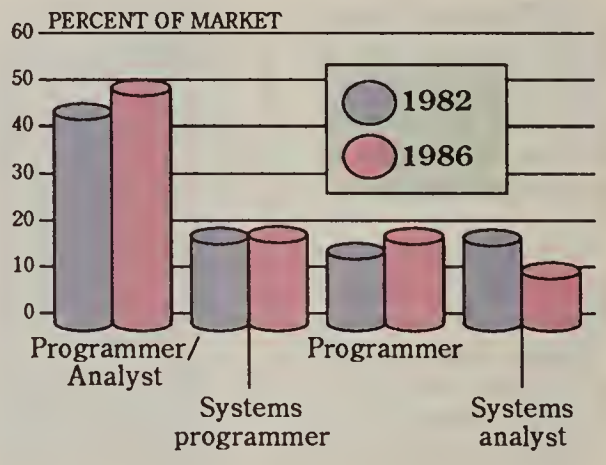
"Most of our applicants have a financial background," Buckland says. "Our experience, so far, is that we get our best results by hiring DP people directly out of college and training them in manufacturing concepts."

The key to success in manufacturing for the DP professional is to be able to understand the terminology and procedures and translate them into viable DP alternatives. Aided by grants from computer manufacturers, a number of educational organizations, including national colleges and universities, are now offering programs in this area.

Manufacturers say they are particularly interested in hiring programmer/analysts with a high degree of communication skills. Most of the new programming for manufacturing requires a working knowledge of the manufacturing pattern, so the programmer/analyst must work closely with people on the shop floor.

While companies are also looking for systems and applications programmers, they are less eager to hire systems analysts because they are relying on the programmer/analyst to perform much of that function.

### Hiring growth in manufacturing




INFORMATION PROVIDED BY DUNHILL PERSONNEL SYSTEMS, INC.
CW CHART: MITCHELL J. HAYES

### Making the switch

DP professionals searching for positions in manufacturing may find better opportunities if they aim their search at familiar industries. Candidates with a background in higher mathematics and engineering possess a definite advantage, especially in robotics and CAD/CAM environments.

Professionals who choose to make the switch from service industries to manufacturing will probably be rewarded with higher salaries. In all job categories, the average salaries in 1986 for manufacturing positions were higher than those in the service industries, according to Dunhill.

A typical programmer/analyst made $30,000 last year in manufacturing companies, compared with $29,000 in service companies, Dunhill says. Manufacturing programmers earned $32,000, while those in service industries earned just less than $27,000. Systems analysts collected $35,500 from manufacturing employers, while service analysts received just less than $34,000. Systems programmers were paid $39,000, bettering service systems programmers' salaries of just less than $37,000.

Farmer is a security administrator for Financial Technologies, Inc. in Chantilly, Va.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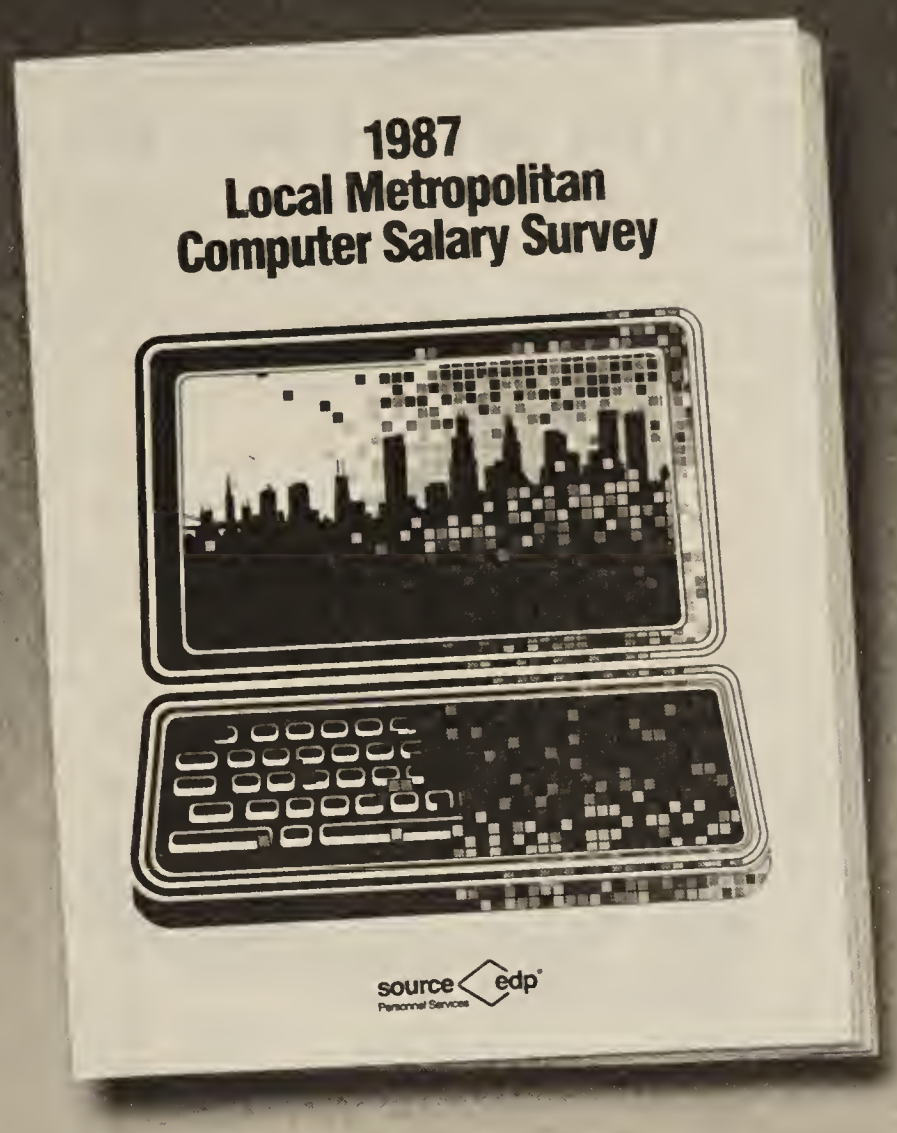


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This high level position requires effective interpersonal skills, demonstrating an ability to successfully interface with all levels of the systems organization. In addition, at least 12 yrs. experience in large scale IMS analysis, design and development is required, with emphasis on top down approaches and structured design/analysis. Significant background in the following is essential:

- Data base design consideration
- On-line vs batch issues
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The Systems International Division of Computer Sciences Corporation is currently seeking an experienced Software Maintenance Instructor to be located in Kent, Washington.

The selected professional will possess a minimum B.S. in Computer Science, or related technical discipline. In addition, candidates must have in-depth knowledge and experience with FORTRAN 77 under VAX/VMS, and be experienced with software maintenance, tools, and debugging aids in the VAX/FORTRAN environment. Experience with DBMS, especially INGRES, is highly desirable.

Candidates must have hands-on experience with software engineering methods and procedures to include design and development of modular systems using top down design and structured programming techniques. Familiarity with development and execution of software test plans and procedures, and experience in the use of automated tools to support software design and documentation is required.

This position requires direct experience as a platform instructor, experience in the preparation of course materials employing the Instructional System Development (ISD) methodology or its equivalent, and technical training experience, preferably of foreign nationals. Familiarity with real-time command and control systems is desired, especially air defense and tactical air operations systems.

CSC offers competitive salaries and a wide variety of benefits. For immediate consideration, please contact Mr. P.J. Gorey, II, Director, Human Resources, (703) 478-7643, or forward your resume in complete confidence to: Computer Sciences Corporation, Systems International Division, 555 Herndon Parkway, Herndon, VA 22070. An equal opportunity employer. M/F/H/V. U.S. Citizenship required.

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# DATA PROCESSING OPERATIONS MANAGER

EMS, The Outdoors Specialists, a dynamic specialty retail chain is experiencing nationwide expansion. This growth has created an opening in the MIS Group for a Data Processing Operations Manager. This position reports to the Director of MIS and is responsible for managing the data entry, control/POS and operations groups within the data processing department.

The qualified candidate will have a degree in Computer Science, Business Administration or related field and at least 5 years of computer operations experience with increasing levels of supervisory responsibility. Experience in the following areas is desirable: retail business, merchandise control & distribution, IBM, System /3X, telecommunications, point-of-sale, capacity & contingency planning.

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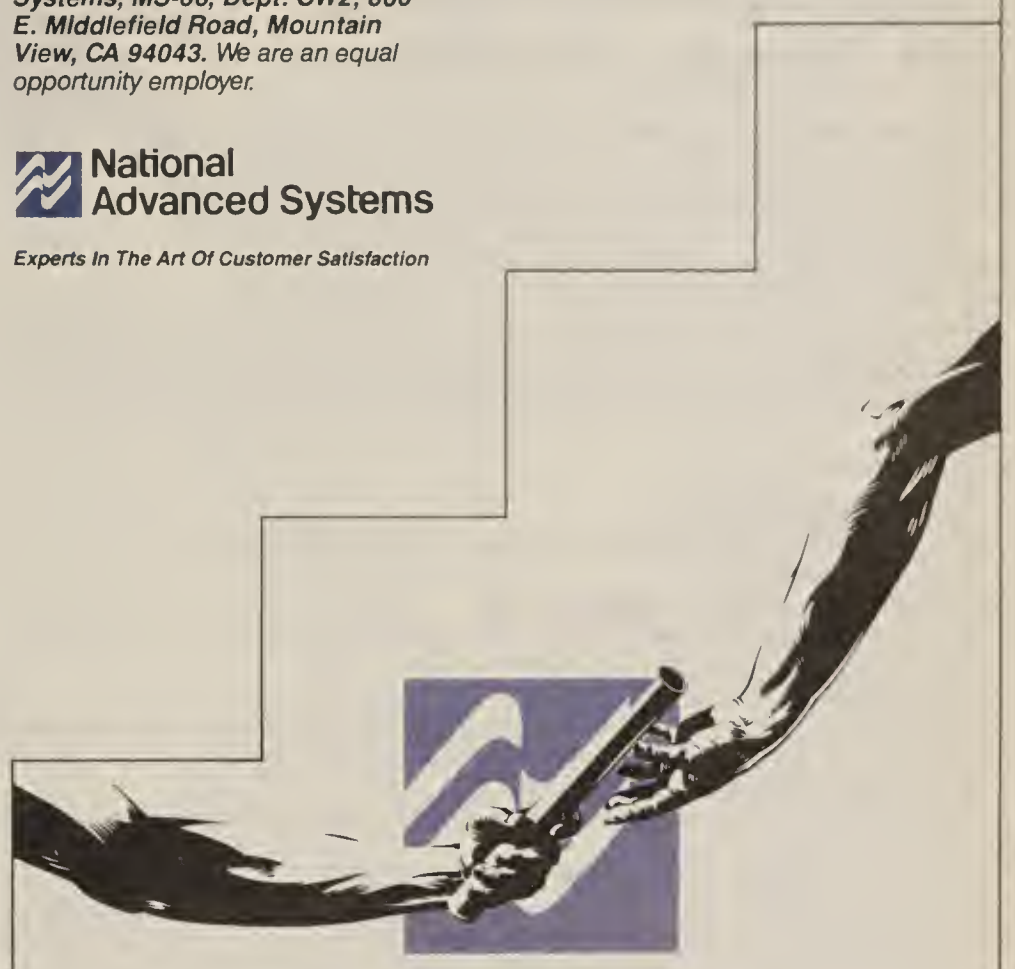

## DATA PROCESSING CENTER EXPANSION

The NYC Department of Correction is currently expanding its administrative data processing staff to assist in the development of its on-line manpower scheduling system and to upgrade and maintain its electronic mail system. We are recruiting for the following:

**SOFTWARE SPECIALIST (2 positions)**

Minimum 4 years programming experience in CICS/COBOL or ADABAS/NATURAL. VSAM or PL/1 experience is a plus. Salary $40K-$42K

**COMPUTER ASSOCIATE SOFTWARE (2 positions)**

Minimum of 3 years experience in COBOL programming, CICS/COBOL, ADABAS/NATURAL, VSAM or PL/1 experience a plus. Salary $35K-$37K

**COMPUTER ASSOCIATE SOFTWARE (1 position)**

Minimum 4 years experience in computer operations or data communications to function as a technical resource person in the diagnosis and correction of problems in a large electronic mail network. Salary $25K.

Please forward all resumes to:

**NYC Department of Correction**
**Recruitment and Certification Section**
**225 Broadway, 13th Floor**
**New York, NY 10007**

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# PROJECT ATHENA OPENINGS

Help shape the future of educational computing. Join Project Athena—a major initiative to enhance education at MIT through the establishment of a campus network of high performance Digital and IBM workstations. The project is now entering phase II—converting from time sharing to a distributed network of workstations.

We are seeking applicants to work in a Unix/C/Fortran/Lisp environment in the following positions:

**APPLICATION DEVELOPMENT PROGRAMMERS (3 one-year appointments)** — to assist Faculty working on the development of educational software and to implement applications programs, standards, and libraries. Will provide the necessary conceptual, technical and standards information to the Faculty and communicate their needs requirements to Athena staff. Minimum of 1 to 3 years' experience with at least two of the following: Unix, C, Fortran, Lisp, or interactive computer graphics in a scientific environment. **(A87-940)**

**CONSULTANT** — to serve Faculty and students through the development, documentation, and implementation of policies and procedures related to the allocation and management of system resources. Will assist users in identifying technical problems; devise solutions; and maintain the user accounts databases. Must be fluent in Unix. Familiarity with a database management system and experience with consulting end users desirable. **(A87-934)**

**SYSTEMS PROGRAMMER** — to join a Systems Development group in building network-based services for a multithousand workstation environment. Existing projects include name-, authorization-, authentication-, file- and notification-servers and the X window system. 3 to 5 years' experience in Unix systems programming required. Familiarity with BSD network facilities preferred. **(A87-937)**

**TECHNICAL WRITER** — to design, research, edit, write, and update Project Athena's user documentation set. Will work with Faculty, programmers, and consulting staff to determine user documentation needs; participate in the design of system and services; and test pre-release software. Strong technical background including knowledge of one programming language; experience in an applications area; and computer science coursework required. Writing sample required. **(A87-877)**

**CONSULTANT (2 positions, part-time, some evening work)** — to provide consulting to Faculty and students using standard end-user software and on-line consulting tools. Will provide feedback to Athena staff about operations in the field. May evaluate pre-release software and provide technical training to users or consultants. Experience consulting end users and strong interpersonal skills required. Experience with Emacs, text formatters, data analysis, graphing packages, and programming desirable. **(A87-936)**

**Please send two copies of resume, referencing appropriate job number to: Sally H. Hansen, MIT Personnel Office, E19-238, 77 Massachusetts Ave., Cambridge, MA 02139.**

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**SYSTEM ANALYSTS**
5+ years BAL/COBOL experience; prior analysis and design experience; excellent communication skills. CICS preferred.

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3+ years experience managing a data communications network. Responsible for the facility and VTAM support of a large national SNA, MSNF, T1 network. Also responsible for Host System CICS software and voice communications.

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**SENIOR RESEARCH ENGINEER/ SYSTEMS PROGRAMMER**

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Minimum requirements include an MS degree in electrical engineering or computer science, at least 6 years experience with computer programming in at least three languages, and at least two years experience with the C programming language. The candidate must have experience with Berkeley Unix 4.2BSD systems internals, demonstrated ability to configure hardware systems and upgrades and ability to interact effectively with a broad spectrum of faculty and staff.

Minimum salary is $32,000; salary depends on qualifications. In order to ensure full consideration, applications must be received by July 15, 1987.

Send resumes including names of at least three individuals who can be contacted for references to Lorraine Selander, Assistant Director, Coordinated Science Laboratory, 1101 West Springfield, Urbana, Illinois 61801 (217) 333-2515.

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**IDMS**
Big name client needs polished IDMS senior P/A to make it happen. Requires 3+ yrs IDMS, ADS/O, MVS, CICS exp.
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## CAROLINAS

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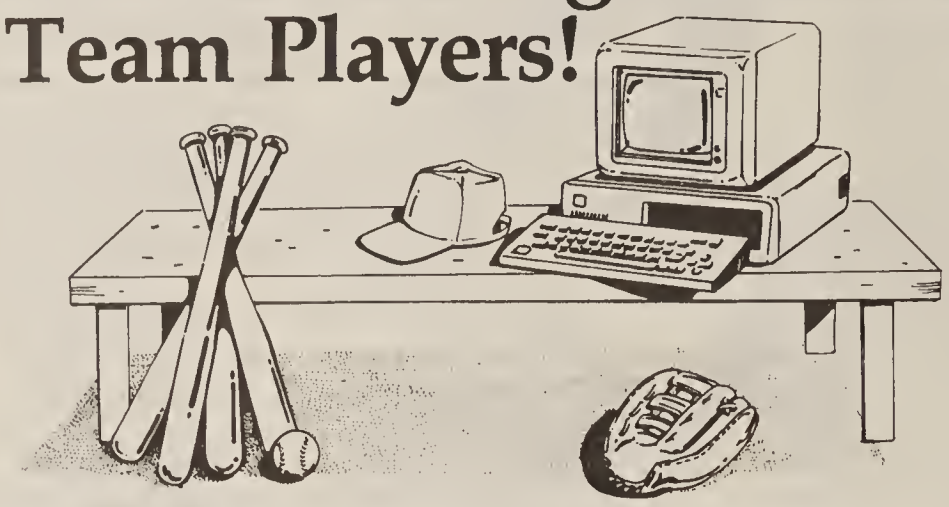

Fidelity Systems Company is looking for team players who can hit the ground running and make a visible contribution to an already top-rated organization. We're building one of the largest data processing organizations in Dallas and want an all out team effort enhanced by individual contribution. If you are an Information Systems Professional who desires the challenges our start-up operation can offer, you belong on the Fidelity Team.

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Data Processing

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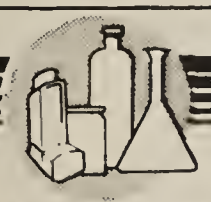

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*COMPUTER OPERATIONS AND SUPPORT*

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The Department of Finance requests proposals to provide for the Acquisition of an Automated Scheduling Software Package.

Copies of the RFP will be made available Thursday, June 25, 1987 upon application to the Department of Finance, Contracts Administration, One Centre Street, Municipal Bldg., Room 1040, New York, NY 10007.

A pre-RFP conference is scheduled for Tuesday, July 30, 1987 at 2:00 pm in the 10th floor Conference Room, 345 Adams Street, Brooklyn.

All inquiries must be submitted in writing before 5:00pm, July 23rd and will be addressed at the scheduled pre-conference.

The deadline for submission in response to this RFP will be 5:00 pm on Friday, August 21, 1987.

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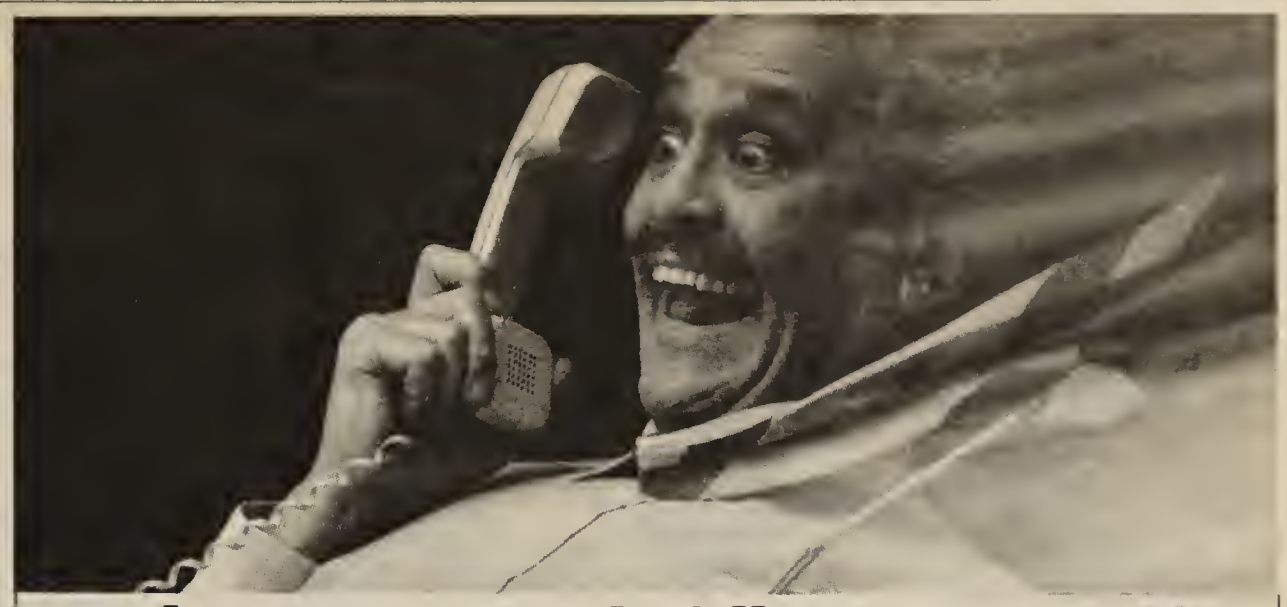

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Sealed proposals will be received by the CDPA, 301 N. Lamar St., 301 Building, Suite 508, Jackson, MS 39201 for the following equipment and services:

**Request for proposal No. 1241,** due Friday, July 17, 1987 at 3:30 p.m. for the lease of eight Wang 423OA-VS terminals for the Division of Women, Infants & Children (WIC) of the STATE DEPARTMENT OF HEALTH. No charge.

**Request for proposal No. 1242,** due Tuesday, July 21, 1987 at 3:30 p.m. for an on-site maintenance contract for IBM and Telex equipment for the MISSISSIPPI DEPARTMENT OF PUBLIC SAFETY, Highway Safety Patrol Division. No charge.

**Request for Proposal No. 1243,** due Thursday, July 23, 1987 at 3:30 p.m. for an on-site maintenance contract for IBM S/36 and peripherals and a Decision Data printer. This equipment is located at the Senatobia, Southhaven, Oxford, and Ashland campuses of NORTHWEST MISSISSIPPI JUNIOR COLLEGE. No charge.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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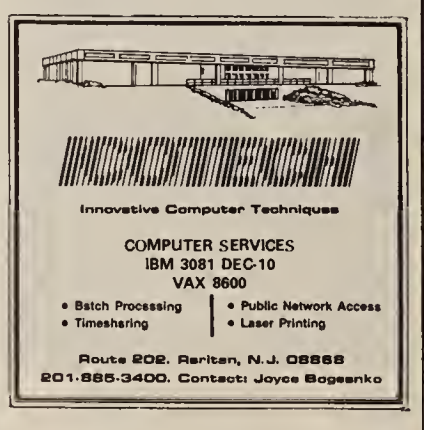


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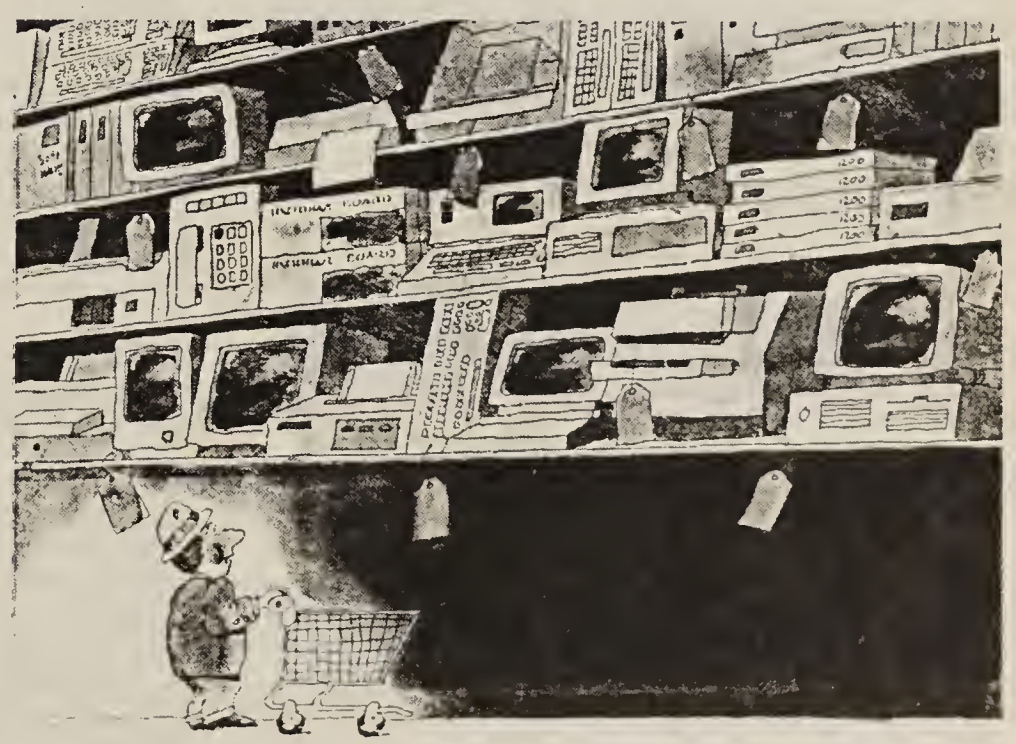

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| Aug. 3 | Communications Software | July 17 |
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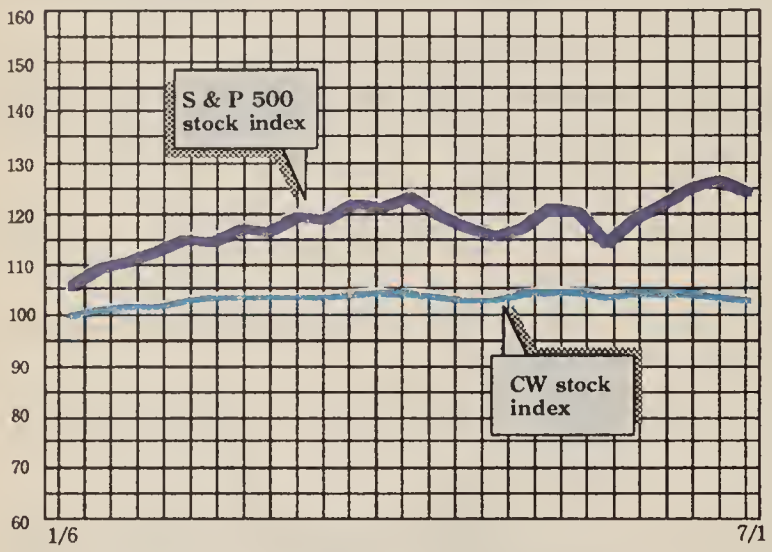


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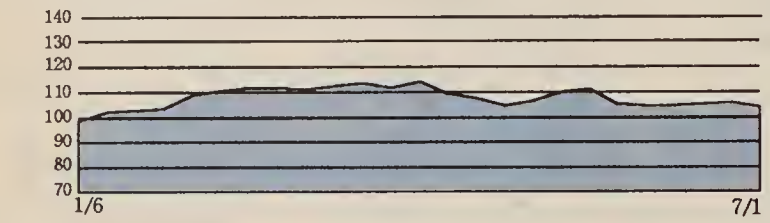


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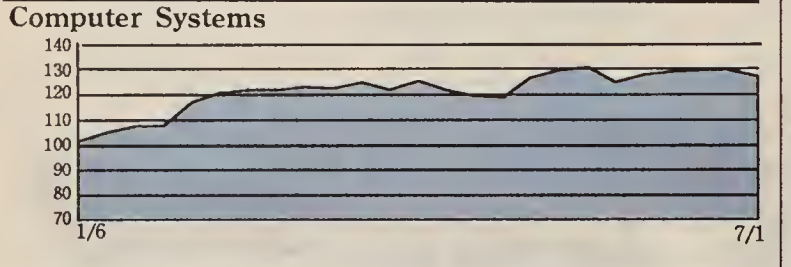


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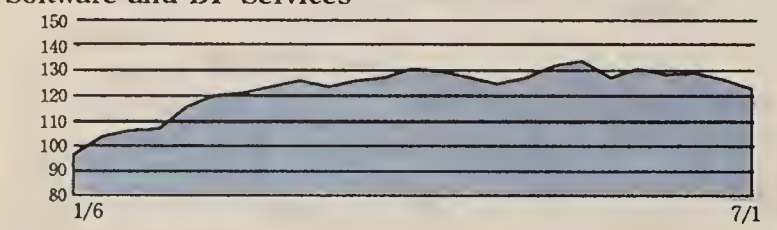


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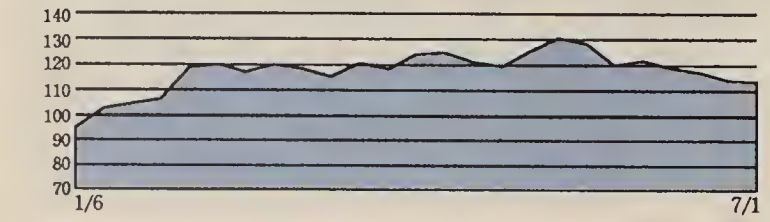


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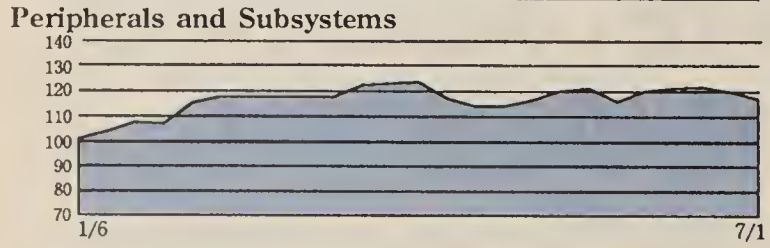


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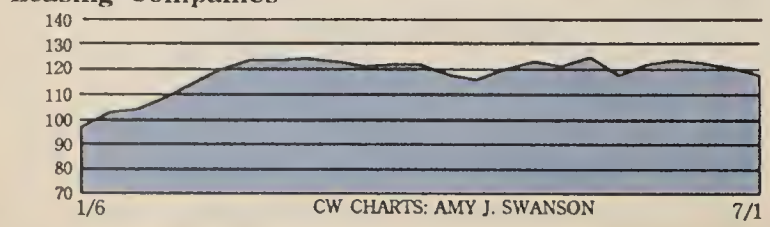


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CLOSING PRICES WEDNESDAY, JULY 1, 1987

| EXCH | | 52-WEEK RANGE (1) | | PRICE CLOSE JULY 1 1987 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| **Communications and Network Services** | | | | | | |
| N | AMERICAN INFO TECHS CORP | 101 | 77 | 87.13 | -1.3 | -1.4 |
| Q | ANDREW CORP | 19 | 14 | 15.50 | +0.3 | +1.6 |
| Q | ARTEL COMM CORP | 6 | 2 | 3.00 | -0.1 | -4.0 |
| N | AT&T | 29 | 22 | 28.38 | -0.3 | -0.9 |
| Q | AVANT GARDE COMP INC | 7 | 3 | 3.63 | +0.0 | +0.0 |
| Q | AVANTEK INC | 19 | 13 | 15.75 | +0.8 | +5.0 |
| N | AYDIN CORP | 38 | 18 | 34.25 | -1.0 | -2.8 |
| N | BELL ATLANTIC CORP | 77 | 62 | 68.25 | -1.9 | -2.7 |
| N | BELLSOUTH CORP | 46 | 35 | 40.75 | -1.4 | -3.3 |
| Q | BRIDGE COMMUNICATION | 27 | 11 | 22.25 | +0.1 | +0.6 |
| Q | COMPRESSION LABS INC | 13 | 4 | 4.50 | -0.3 | -5.3 |
| O | COMPUTER NETWORK TECH | 8 | 4 | 4.00 | -0.3 | -5.9 |
| O | CONTEL CORP | 35 | 27 | 32.38 | -0.4 | -1.1 |
| Q | DATA SWITCH CORP | 9 | 5 | 6.75 | -0.3 | -3.6 |
| Q | DIGITAL COMM ASSOC | 49 | 16 | 33.75 | +4.9 | +16.9 |
| Q | DYNATECH CORP | 44 | 27 | 31.00 | +0.8 | +2.5 |
| Q | EQUATORIAL COMM CO | 8 | 2 | 3.13 | +0.1 | +4.2 |
| Q | GANDALF TECHNOLOGIES | 11 | 5 | 8.13 | +0.0 | +0.0 |
| Q | GENERAL DATACOMM INDS | 14 | 8 | 9.63 | +0.1 | +1.3 |
| N | GTE CORP | 43 | 34 | 38.50 | -1.0 | -2.5 |
| Q | INFOTRON SYS CORP | 15 | 7 | 10.00 | +0.3 | +2.6 |
| N | ITT CORP | 66 | 47 | 58.00 | -1.4 | -2.3 |
| N | M A COM INC | 17 | 12 | 13.75 | -0.3 | -1.8 |
| Q | MCI COMMUNICATIONS CORP | 11 | 5 | 7.38 | -0.3 | -3.3 |
| Q | MICOM SYS INC | 18 | 10 | 12.75 | -1.8 | -12.1 |
| Q | NETWORK SYS CORP | 19 | 9 | 9.75 | +0.0 | +0.0 |
| N | NORTHERN TELECOM LTD | 23 | 13 | 21.00 | -0.5 | -2.3 |
| Q | NOVELL INC | 27 | 9 | 19.50 | -0.3 | -1.3 |
| N | NYNEX CORP | 73 | 59 | 69.38 | -1.6 | -2.3 |
| N | PACIFIC TELESIS GROUP | 31 | 23 | 26.50 | -1.1 | -4.1 |
| N | PARADYNE CORP | 9 | 4 | 6.88 | -0.3 | -3.5 |
| A | PENRIL CORP | 6 | 4 | 4.63 | -0.3 | -5.1 |
| N | PLESSEY PLC | 41 | 24 | 37.00 | +0.0 | +0.0 |
| N | SCIENTIFIC ATLANTA INC | 20 | 9 | 19.50 | -0.4 | -1.9 |
| N | SOUTHWESTERN BELL CORP | 41 | 33 | 38.88 | -1.0 | -2.5 |
| Q | 3 COM CORP | 24 | 9 | 18.50 | -0.6 | -3.3 |
| N | TIMEPLEX INC | 41 | 14 | 30.50 | -4.3 | -12.2 |
| Q | UNGERMANN BASS INC | 16 | 7 | 12.38 | -0.9 | -6.6 |
| N | U S WEST INC | 62 | 45 | 53.13 | -1.0 | -1.8 |
| **Computer Systems** | | | | | | |
| Q | ALLIANT COMPUTER SYS | 37 | 16 | 28.00 | -2.3 | -7.4 |
| Q | ALPHA MICROSYSTEMS | 7 | 3 | 4.50 | +0.9 | +24.1 |
| Q | ALTOS COMPUTER SYS | 17 | 10 | 12.63 | -0.5 | -3.8 |
| A | AMDAHL CORP | 42 | 16 | 35.25 | -1.9 | -5.1 |
| Q | APOLLO COMPUTER INC | 25 | 9 | 19.25 | -2.0 | -9.4 |
| Q | APPLE COMPUTER INC | 43 | 15 | 40.00 | -0.5 | -1.2 |
| N | BOLT BERANEK & NEWMAN | 60 | 37 | 43.63 | -2.1 | -4.6 |
| Q | BRITTON LEE INC | 5 | 3 | 3.25 | -0.8 | -18.8 |
| N | COMPAQ COMPUTER CORP | 51 | 12 | 46.63 | +2.8 | +6.3 |
| Q | COMPUTER AUTOMATION INC | 17 | 2 | 14.00 | -1.0 | -6.7 |
| A | COMPUTER CONSOLES INC | 12 | 7 | 9.50 | +0.0 | +0.0 |
| Q | CONCURRENT COMP CORP | 19 | 11 | 17.00 | +0.3 | +1.5 |
| N | CONTROL DATA CORP DEL | 35 | 20 | 28.38 | -1.3 | -4.2 |
| Q | CONVERGENT TECH | 12 | 4 | 7.00 | +0.3 | +3.7 |
| Q | CONVEX COMPUTER CORP | 22 | 8 | 15.63 | -1.4 | -8.1 |
| N | CRAY RESH INC | 136 | 69 | 101.63 | +1.0 | +1.0 |
| Q | DAISY SYS CORP | 13 | 8 | 7.88 | -0.3 | -3.1 |
| N | DATA GEN CORP | 39 | 25 | 31.88 | +0.6 | +2.0 |
| N | DATAPOINT CORP | 9 | 4 | 6.50 | +0.0 | +0.0 |
| N | DIGITAL EQUIP CORP | 175 | 82 | 164.63 | -3.9 | -2.3 |
| N | FLOATING POINT SYS INC | 38 | 8 | 9.63 | +0.8 | +8.5 |
| N | GOULD INC | 22 | 15 | 19.75 | -0.6 | -3.1 |
| N | HARRIS CORP DEL | 43 | 27 | 36.75 | -0.6 | -1.7 |
| N | HEWLETT PACKARD CO | 67 | 36 | 60.13 | -3.0 | -4.8 |
| N | HONEYWELL INC | 85 | 58 | 81.00 | -1.9 | -2.3 |
| N | IBM | 169 | 116 | 164.00 | -3.9 | -2.3 |
| Q | INFORMATION INTL INC | 18 | 13 | 14.00 | +0.3 | +1.8 |
| Q | IPL SYS INC | 4 | 2 | 2.88 | +0.0 | +0.0 |
| Q | MASS COMPUTER CORP | 10 | 5 | 8.13 | -0.1 | -1.5 |
| N | MATSUSHITA ELEC INDL LTD | 157 | 77 | 152.00 | -4.3 | -2.7 |
| Q | MEGADATA CORP | 7 | 2 | 5.75 | +0.0 | +0.0 |
| Q | MENTOR GRAPHICS CORP | 34 | 11 | 29.50 | -1.0 | -3.3 |
| N | NBI INC | 13 | 8 | 12.13 | -0.5 | -4.0 |
| N | NCR CORP | 80 | 42 | 74.13 | -2.8 | -3.6 |
| N | PRIME COMPUTER INC | 30 | 16 | 26.00 | -0.1 | -0.5 |
| Q | PYRAMID TECHNOLOGY | 12 | 4 | 9.25 | -1.4 | -12.9 |
| Q | STRATUS COMPUTER | 41 | 18 | 34.25 | -1.5 | -4.2 |
| Q | SUN MICROSYSTEMS INC | 46 | 11 | 42.13 | +0.8 | +1.8 |
| Q | SYMBOLICS INC | 12 | 4 | 4.13 | +0.0 | +0.0 |
| N | TANDEM COMPUTERS INC | 38 | 14 | 32.00 | +0.0 | +0.0 |
| N | TANDY CORP | 56 | 31 | 42.75 | -2.3 | -5.0 |
| N | ULTIMATE CORP | 29 | 13 | 26.63 | -1.1 | -4.1 |
| N | UNISYS CORP | 128 | 62 | 123.38 | -4.1 | -3.2 |
| A | WANG LABS INC | 19 | 11 | 15.88 | -0.5 | -3.1 |
| **Software & DP Services** | | | | | | |
| Q | ADVANCED COMP TECH | 6 | 3 | 4.00 | +0.0 | +0.0 |
| N | ADVANCED SYS INC | 25 | 12 | 24.63 | +0.6 | +2.6 |
| N | AGS COMPUTERS INC | 22 | 8 | 17.25 | -0.6 | -3.5 |
| Q | AMERICAN MGMT SYS INC | 19 | 7 | 17.38 | -0.9 | -4.8 |
| Q | AMERICAN SOFTWARE INC | 22 | 7 | 14.50 | -0.5 | -3.3 |
| N | ANACOMP INC | 9 | 3 | 8.50 | -0.4 | -4.2 |
| Q | ANALYSTS INTL CORP | 11 | 4 | 9.13 | +0.1 | +1.4 |
| Q | ASHTON TATE | 30 | 10 | 24.75 | -1.8 | -6.6 |
| Q | ASK COMPUTER SYS INC | 17 | 9 | 12.38 | -0.1 | -1.0 |
| Q | AUTODESK INC | 285 | 8 | 25.00 | -0.5 | -2.0 |
| N | AUTO DATA PROCESSING | 51 | 29 | 47.50 | -2.3 | -4.5 |
| Q | BOOLE & BABBAGE INC | 11 | 4 | 10.50 | -0.1 | -1.2 |
| N | COMPUTER ASSOC INTL INC | 29 | 10 | 24.75 | -1.0 | -3.9 |
| Q | COMPUTER HORIZONS CORP | 15 | 10 | 12.75 | +0.0 | +0.0 |
| N | COMPUTER SCIENCES CORP | 61 | 30 | 56.38 | -1.3 | -2.2 |
| N | COMPUTER TASK GROUP INC | 18 | 11 | 13.13 | -0.4 | -2.8 |
| Q | COMSHARE INC | 28 | 11 | 25.75 | +0.5 | +2.0 |
| N | CULLINET SOFTWARE INC | 13 | 6 | 11.63 | -0.3 | -2.1 |
| Q | CYCARE SYS INC | 14 | 7 | 9.00 | +0.4 | +4.3 |
| Q | DUQUESNE SYS INC | 33 | 12 | 21.75 | +1.0 | +4.8 |
| Q | ENDATA INC | 12 | 5 | 10.38 | -1.5 | -12.6 |
| N | GENERAL MTRS (CL E) | 48 | 24 | 38.88 | -1.5 | -3.7 |
| Q | HOGAN SYS INC | 17 | 9 | 13.13 | -1.1 | -7.9 |
| Q | INFORMIX CORP | 23 | 7 | 18.88 | +0.0 | +0.0 |
| Q | INTELLICORP INC | 11 | 4 | 7.25 | -1.9 | -20.5 |
| Q | KEANE INC | 15 | 5 | 9.00 | +0.0 | +0.0 |
| Q | LOTUS DEV CORP | 37 | 9 | 28.75 | -1.3 | -4.2 |
| Q | MANAGEMENT SCI AMER | 21 | 11 | 11.88 | +0.3 | +2.2 |
| Q | MICRO PRO INTL CORP | 8 | 2 | 5.88 | -0.1 | -2.1 |
| Q | MICROSOFT CORP | 128 | 26 | 102.50 | -2.0 | -1.9 |
| Q | NATIONAL DATA CORP | 27 | 16 | 21.25 | -0.5 | -2.3 |
| Q | ON LINE SOFTWARE INTL INC | 20 | 6 | 16.88 | +0.1 | +0.7 |
| Q | ORACLE SYS CORP | 30 | 7 | 22.13 | -1.4 | -5.9 |
| N | PANSOPHIC SYS INC | 23 | 12 | 19.75 | -1.3 | -6.0 |
| Q | POLICY MGMT SYS CORP | 30 | 15 | 24.50 | -1.5 | -5.8 |
| Q | PROGRAMMING & SYS INC | 13 | 8 | 10.25 | +0.0 | +0.0 |
| Q | REYNOLDS & REYNOLDS CO | 42 | 27 | 32.50 | -1.5 | -4.4 |
| Q | SEI CORP | 17 | 8 | 17.00 | +0.3 | +1.5 |
| Q | SHARED MED SYS CORP | 53 | 23 | 27.13 | -0.8 | -2.7 |
| Q | SOFTWARE AG SYSTEMS INC | 20 | 10 | 13.50 | +0.1 | +0.9 |
| Q | SOFTWARE PUBG CORP | 17 | 5 | 8.75 | -1.3 | -12.5 |
| A | STERLING SOFTWARE INC | 21 | 9 | 10.88 | -0.4 | -3.3 |
| Q | SUNGARD DATA SYS INC | 21 | 10 | 18.25 | -0.3 | -1.4 |
| Q | SYSTEMATICS INC | 30 | 14 | 25.75 | -0.3 | -1.0 |
| N | UCCEL CORP | 45 | 18 | 40.75 | -1.5 | -3.6 |
| N | URS CORP | 21 | 13 | 17.38 | -0.1 | -0.7 |
| Q | VM SOFTWARE INC | 45 | 16 | 23.00 | +0.0 | +0.0 |
| **Semiconductors** | | | | | | |
| N | ADV MICRO DEVICES INC | 25 | 13 | 18.75 | +0.1 | +0.7 |
| N | ANALOG DEVICES INC | 24 | 14 | 19.25 | -0.3 | -1.3 |
| Q | ANALOGIC CORP | 13 | 10 | 10.75 | -0.6 | -5.5 |
| Q | INTEL CORP | 48 | 16 | 45.50 | +3.8 | +9.0 |
| Q | LSI LOGIC CORP | 17 | 8 | 10.38 | +0.0 | +0.0 |
| Q | MONOLITHIC MEMORIES INC | 19 | 10 | 16.00 | +0.1 | +0.8 |
| N | MOTOROLA INC | 64 | 34 | 53.50 | -2.6 | -4.7 |
| N | NATL SEMICONDUCTOR | 17 | 8 | 12.75 | -0.3 | -1.9 |
| N | TEXAS INSTRS INC | 68 | 34 | 60.13 | -1.4 | -2.2 |
| A | WESTERN DIGITAL CORP | 33 | 11 | 25.00 | -0.9 | -3.4 |
| **Peripherals** | | | | | | |
| N | AM INTL INC | 9 | 5 | 7.38 | -0.4 | -4.8 |
| Q | AST RESH INC | 23 | 11 | 14.00 | -1.4 | -8.9 |
| Q | AUTO TROL TECH CORP | 9 | 3 | 6.00 | -0.8 | -11.1 |
| Q | BANCTEC INC | 16 | 6 | 12.13 | -1.3 | -9.3 |
| Q | CIPHER DATA PRODS INC | 18 | 10 | 11.00 | -0.4 | -3.3 |
| A | COGNITRONICS CORP | 5 | 2 | 4.25 | -0.3 | -5.6 |
| N | COMPUGRAPHIC CORP | 24 | 16 | 23.50 | +0.8 | +3.3 |
| N | COMPUTERVISION CORP | 23 | 10 | 15.00 | -0.5 | -3.2 |
| N | CONRAC CORP | 30 | 12 | 27.25 | +0.0 | +0.0 |
| A | DATAPRODUCTS CORP | 16 | 10 | 11.13 | -0.3 | -2.2 |
| A | DATARAM CORP | 10 | 7 | 7.25 | -0.1 | -1.7 |
| N | DECISION INDS CORP | 14 | 7 | 9.75 | -0.3 | -2.5 |
| N | EASTMAN KODAK CO | 89 | 52 | 85.63 | -3.6 | -4.1 |
| Q | E M C CORP MASS | 34 | 11 | 28.50 | -0.3 | -0.9 |
| Q | EMULEX CORP | 10 | 5 | 7.38 | -0.6 | -7.8 |
| Q | EVANS & SUTHERLAND | 40 | 20 | 32.50 | -0.8 | -2.3 |
| Q | ICOT CORP | 13 | 5 | 6.75 | +0.3 | +3.8 |
| Q | INTERLEAF INC | 20 | 8 | 15.75 | -1.3 | -7.4 |
| Q | IOMEGA CORP | 13 | 2 | 3.88 | +0.3 | +6.9 |
| Q | LEE DATA CORP | 10 | 5 | 5.50 | -1.0 | -15.4 |
| Q | MASSTOR SYS CORP | 5 | 2 | 4.25 | +0.1 | +3.0 |
| Q | MAXTOR CORP | 34 | 10 | 19.25 | +0.0 | +0.0 |
| Q | MICROPOLIS CORP | 44 | 14 | 35.88 | +4.0 | +12.5 |
| Q | MINISCRIBE CORP | 18 | 5 | 16.38 | +0.8 | +4.8 |
| N | MINNESOTA MNG & MFG CO | 73 | 50 | 69.88 | -3.0 | -4.1 |
| A | MISI DATA CORP | 18 | 10 | 17.50 | -0.8 | -4.1 |
| Q | PRIAM CORP | 6 | 2 | 4.63 | -0.1 | -2.6 |
| Q | PRINTRONIX INC | 14 | 10 | 12.00 | +0.1 | +1.1 |
| N | QMS INC | 18 | 11 | 16.38 | -0.3 | -1.5 |
| Q | QUANTUM CORP | 35 | 15 | 16.25 | -0.5 | -3.0 |
| Q | RAMTEK CORP | 6 | 4 | 5.06 | -0.2 | -3.6 |
| N | RECOGNITION EQUIP INC | 27 | 10 | 19.75 | -0.9 | -4.2 |
| Q | REXON INC | 14 | 5 | 9.50 | -0.4 | -3.8 |
| Q | SCAN TRON CORP | 19 | 11 | 11.75 | +0.0 | +0.0 |
| Q | SEAGATE TECHNOLOGY | 46 | 10 | 33.38 | -1.1 | -3.3 |
| N | STORAGE TECH CORP | 5 | 2 | 3.63 | +0.0 | +0.0 |
| Q | TANDON CORP | 7 | 2 | 5.13 | -0.3 | -4.7 |
| A | TEC INC | 7 | 3 | 5.13 | -0.9 | -14.6 |
| N | TEKTRONIX INC | 43 | 27 | 38.63 | +0.4 | +1.0 |
| Q | TELEVIDEO SYS INC | 3 | 2 | 2.50 | +0.0 | +0.0 |
| N | TELEX CORP | 102 | 52 | 71.50 | -1.3 | -1.7 |
| Q | WYSE TECH | 35 | 13 | 28.13 | +1.3 | +4.7 |
| N | XEROX CORP | 81 | 49 | 76.63 | -2.6 | -3.3 |
| Q | XIDEX CORP | 20 | 11 | 11.50 | +0.0 | +0.0 |
| **Leasing Companies** | | | | | | |
| N | COMDISCO INC | 33 | 15 | 30.13 | -0.9 | -2.8 |
| N | CONTINENTAL INFO SYS | 14 | 7 | 11.88 | -0.6 | -5.0 |
| Q | PHOENIX AMERN INC | 8 | 3 | 4.25 | -0.3 | -5.6 |
| Q | SELECTERM INC | 8 | 5 | 5.25 | +0.0 | +0.0 |
| N | U S LEASING INTL | 53 | 38 | 52.00 | +0.3 | +0.5 |

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL; O = OVER-THE-COUNTER; S = SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

# Rodime plunges

## *Drive maker's stock drops 48% amid massive investor sell-off*

Investors have battered the U.S.-listed stock of Scottish disk drive vendor Rodime PLC after the firm announced 10 days ago that it expects to report its fourth straight losing quarter.

In the four days of trading ended Wednesday, Rodime's over-the-counter stock plummeted 48%, from an opening price of 9⅜ bid on Friday, June 26 to a close of 4⅞. That plunge included single-day percentage drops of 23% on June 26 and 29% — the largest over-the-counter market loss of the day — on June 29.

Rodime's stock debacle is the latest example of massive investor sell-off when a company reverses itself on earlier predictions of improved business.

In April, Rodime announced that its quarter ended June 30 would show a significant revenue increase from the previous quarter. However, the company's revised recent assessment noted that reported sales would actually fall 18%.

Other recent industry examples of similar financial faux pas — with comparable stock market reactions — include Floating Point Systems, Inc. and Daisy Systems Corp.

CLINTON WILDER

# DEC adds bus licenses

*Two vendors receive VAXBI bus authorization*

BY ELISABETH HORWITT
CW STAFF

Two Transmission Control Protocol/Internet Protocol (TCP/IP) networking companies have joined the elite ranks of third-party vendors with licenses to develop products for the VAXBI bus, Digital Equipment Corp.'s newest bus architecture.

Excelan, Inc. in San Jose, Calif., announced last week that it had obtained the license to the VAXBI bus. Excelan's competitor, Micom-Interlan, Inc. in Boxboro, Mass., made a comparable announcement two weeks ago.

Both companies already offer intelligent CCITT 802.3 Ethernet controllers that allow DEC VAX Unibus and Q-bus systems to communicate with other vendors' systems using TCP/IP.

DEC reportedly has been frustrating third-party vendors by making it difficult for the vendors to obtain a VAXBI bus license. Approximately 30 companies are currently said to have licenses.

The license allows the networking vendors to develop controllers that link directly to the VAX 8000 bus without the need for a Unibus adapter, according to Micom-Interlan, a subsidiary of Micom Systems, Inc.

This should significantly reduce the cost of such products, the vendor added.

"The VAXBI bus license is a natural transition of our relationship with DEC," said Micom-Interlan President Michael Barker. "We offer one of two DEC-supported Decnet-Ethernet controllers for the IBM Personal Computers."

TCP/IP provides a link between DEC products and non-DEC computers that do not support the firm's Decnet networking system, according to Barker. DEC depends on third-party vendors to provide TCP/IP connectivity for its hosts because "it is committed to Decnet and to migration to Open Systems Interconnect," Barker said.

DEC reportedly has been frustrating third-party vendors by making it difficult for the vendors to obtain a VAXBI bus license.

DEC spokesmen have cited OSI as the company's strategy for offering multivendor connectivity; however, while TCP/IP is mature and supported by a wide range of vendors, the OSI standard is currently still under development.

Micom-Interlan reportedly plans to ship its intelligent VAXBI bus Ethernet controller, to be named NP800, in the first quarter of 1988. Excelan cited a mid-1988 shipping date for its VAXBI bus Ethernet boards and software.

Pricing information was not available from either of the companies.

# SQL data base link crosses system gaps

BY CHARLES BABCOCK
CW STAFF

MENLO PARK, Calif. — Gupta Technologies, Inc. is expected to release this month a distributed networking product that can tie together different vendors' SQL-based data base management systems on different-size machines.

SQL Net employs IBM's LU6.2 application-to-application communications standard, giving it two standards with which to work, company President Umang Gupta said last week. The IBM SQL standard allows a user at a personal computer to formulate a query using another Gupta product, SQL Base.

The LU6.2 standard allows the query to be transmitted to the proper data base management system, where it will extract data in the same manner it would if it were running against its local data base.

"This is the first program that uses Advanced Program-to-Program Communications [APPC] to directly communicate with a remote data base. The host becomes like an extension of the PC data base," said Richard Finkelstein, manager of the Codd and Date Consulting Group in Chicago.

The initial release of SQL Net supports data distribution between SQL Base and IBM's DB2 under the mainframe MVS environment of CICS/VS, Gupta said.

The $50,000 network product is made up of two components. SQL Host runs on an IBM mainframe as a CICS transaction program. SQL Gateway uses an IBM Personal Computer on any IBM Netbios-compatible local-area network as a gateway to mainframe- and minicomputer-based SQL data bases.

Each gateway PC must have an IBM Synchronous Data Link Control board connection to the mainframe via a leased or dial-up line or an IBM Token-Ring connection via an IBM 3720 or 3725 communications processor or a 3174/1L terminal controller. IBM's APPC/PC package is required on the PC gateway machine.

# Unisys offers 5G-byte disk drives

BY JAMES CONNOLLY
CW STAFF

BLUE BELL, Pa. — Unisys Corp. last week announced a quadrupling in on-line storage capabilities for mainframes made by the former Burroughs Corp. as the company introduced a 5G-byte disk drive comparable to the IBM 3380E models.

The Unisys 9494-24 is intended to provide users with greater storage capacity at a lower cost per megabyte than is available with the 2-year-old Unisys 9494-12. That machine, which has a formatted capacity of 868M bytes and an unformatted capacity of 1.2G bytes, remains available, according to Harry Goldberg, Unisys program manager for disk products. Both drives are manufactured at Unisys' Santa Clara, Calif., peripherals facility, he said.

The 9494-24 was designed for use with Unisys A series, V series and B7900 mainframes.

### Thin-film heads

Like the earlier model, the 9494-24 uses thin-film heads. The new model features two head-disk assemblies (HDA) per drive instead of one HDA and provides double the capacity with each HDA, Goldberg said. The new drive features a 17-msec average access time, compared with a 16-msec access time in the single-capacity drive. Goldberg said the time difference is negligible and is consistent with the differences among IBM 3380 models.

He said the older 9494-12 with a 9389 storage controller, a 9399 string controller and eight drives costs $355,300. A new 10G-byte 9494-24 configuration, consisting of a 9389, a 9399-E with an integrated drive and one additional drive, costs $288,090. The 9399-E and integrated drive costs $129,150 and can support up to three more drives, which each cost $98,140.The 9494-24 is available immediately, Goldberg said.

# Juggler

FROM PAGE 1

applications that provide communications capability may have problems running under Juggler.

Although Juggler should arrive well before OS/2, Apple has yet to announce the product. "We don't preannounce versions of our operating system," an Apple official said.

But a demonstration of Juggler given to *Computerworld* points out the ease with which users can open multiple applications and share data through cut-and-paste functions while applications share the same screen.

And, like the latest version of Microsoft Windows, Juggler uses overlapping, rather than tiled, windows. These features are a major enhancement to the Macintosh's ability to exchange data and switch among applications. In addition, Macintoshes equipped with Microsoft's MS-DOS coprocessor boards will be able to run MS-DOS applications in a window. Most MS-DOS programs will not need to be modified to run in Juggler's windows.

While most existing applications are expected to run unaltered under Juggler, some minor modifications may be required to ensure compatibility, especially with communications software.

### Limitations

"The one thing that Juggler does not do very well is in ownership of certain system resources, like the serial ports," said one of the developers briefed by Apple. "If you have some serial activity going on, you don't really have any control.

"That is why it is not true multitasking: because the operating system does not do the resource arbitration," the developer said.

The lack of resource arbitration may pose a threat to the compatibility of communications software, a key application for a multitasking environment, the developer added. "Right now, there is a lot of concern that, given the current release, if I am the author of any software that does communications, I have got problems."

In contrast to OS/2, which will offer full multitasking capabilities, Juggler will provide nonpreemptive multitasking, which is not considered to be multitasking in the strictest sense.

Under preemptive multitasking, which is the pure form, the operating system assigns priorities to tasks and ensures that each task has adequate resources to run effectively. "It is not true multitasking unless the events that occur in one application have no side effects on any other applications running in the system. You can't guarantee that with Juggler," the developer said.

### Multitask apparition

Despite the limitation, software that is written closely to Apple's standard software-development guidelines appears to the user to be a true multitasking program. A user, for example, could work with a word processing package while a data base was sorting or a spreadsheet was recalculating.

Although it will not be supported in the initial release, a later release of Juggler will provide virtual memory capability, under which hard-disk memory can serve as RAM, an Apple official said. This will be a key feature of the initial release of OS/2.

True multitasking may be available in a later release of Juggler, but such a version would only run on the Macintosh II, which uses the Motorola, Inc. 68020 processor. It is not expected to be available any time in the near future.

"The only way you are going to get true multitasking is in a product that supports the PMMU [paged memory management unit]," said a source close to Apple. The PMMU is the 68851 support chip that is part of the 68020 family upon which the Macintosh II is based. The chip allows applications to have separate and protected memory partitions.

Because applications are not fully protected from one another, problems can occur. "If you crash in Juggler on an SE or a Plus, you have a chance of corrupting the machine or crashing the set of tasks that is running," a developer said. With the PMMU version, however, "even if one application crashes, all the other applications continue to run."

### With bated breath

Users are looking forward to the release of Juggler. "Everybody is anticipating Juggler. A lot of users are going to like it," said Rick Richardson, national director of technology development for Arthur Young in New York. "If it says anything, it says buy more memory," Richardson said. Other users interviewed last week agreed.

Richardson, who describes the Juggler concept as a "nice add-in," is skeptical about the need for multitasking, viewing it as helpful only for background communications or for recalculating large spreadsheets.

The appeal of Juggler for Richardson is a hoped-for improvement in the ability to cut and paste data.

# Symphony option targets tech users

*Lotus's Measure works within older tool; firm also inks pact with HP*

BY ALAN J. RYAN
CW STAFF

CAMBRIDGE, Mass. — Lotus Development Corp. last week announced a software package aimed at engineers and scientists who work with the company's Symphony software.

Measure for Symphony was designed to work within Symphony to collect data from measurement instruments and transfer it directly into the spreadsheet for analysis, storage and graphic display. The program's features and functions are basically the same as those of Measure for 1-2-3, according to a company spokeswoman.

The instruments are connected to a personal computer via one of three interfaces included in the software, which are the IEEE 488, RS-232C and analog-to-digital plug-in-board interfaces. Measure takes the data from the instruments and plugs it directly into Symphony or 1-2-3, where it can be graphed or incorporated into a document or plugged into the spreadsheet, Lotus said.

### Users control data

The user is responsible for sending the information to the correct area in the spreadsheet and uses instructions via macros to do so. The user can also manipulate the data as it is coming into those areas.

The Measure 488 Interface allows users to streamline the process of collecting data by connecting Symphony to IEEE 488-compatible instruments, including multimeters and digital oscilloscopes.

The RS-232 Interface reportedly provides simplex, half-duplex and full-duplex communications with any RS-232C-compatible hardware such as lab balances and bar-code scanners.

The Measure Analog-to-Digital Interface works with a plug-in data acquisition board that can be directly connected to sensors such as thermocouplers, strain gauges and more, the vendor said.

Measure for Symphony runs on the IBM Personal Computer, PC XT and AT, the Hewlett-Packard Co. Vectra C and the Compaq Computer Corp. Portable. It is scheduled to be available in the middle of this month for $495.

In other announcements, HP and Lotus said last week they have signed an agreement under which HP will distribute and support Measure for 1-2-3 and Measure for Symphony on a worldwide basis as part of its product line.

# Judge Greene

FROM PAGE 1

services, Greene called the Justice Department's support for state-by-state review of the competitive situation a "far-fetched" antitrust theory.

Greene also said he was "astonished" that the Justice Department wants to relinquish its job of determining whether the Bell holding companies have subsidized their unregulated business ventures with telephone ratepayer funds.

During the third day of hearings, which concerned information services such as videotex and on-line data bases, Greene was skeptical about assertions that the FCC's rules for Open Network Architecture (ONA) will prevent the Bell holding companies from giving other information service providers low-quality or overpriced access to the local network.

"Are you talking about the FCC regulations that aren't in effect yet?" Greene asked the department's lawyer, Nancy Garrison. ONA plans must be filed with the FCC in 1988 and are not likely to be approved until 1989 or thereafter.

To base a decision about lifting the information services restriction on the assurance that there will be ONA plans in 1988 or 1989, Greene said, "seems to be a pretty thin reed. Do you have something more than that?"

> "ARE YOU talking about the FCC regulations that aren't in effect yet?"
>
> JUDGE HAROLD H. GREENE
> U.S. DISTRICT COURT

But Greene — who showed keen interest in the French telephone authority's role in the Minitel videotex system — seemed open to some limited role for the Bell holding companies in the information services industry [CW, June 29].

For example, Greene asked information service vendors whether the court should allow the Bell companies to offer transmission services integrated with information services but not the editorial content.

Donald E. Ward, attorney for the on-line data base companies and others, said it would be too difficult to distinguish between transmission and content.

While many information service companies opposed entry of the Bell holding companies into their turf, the Videotex Industry Association supported removal of the restriction on information services.

Howard Liberman, an attorney for the videotex association, said the industry is not afraid of competition with the Bell holding companies if the FCC implements the appropriate safeguards.

Industry analysts have suggested that struggling videotex companies will be rescued by alliances with the Bell holding companies, which can profit from the increased traffic on their networks.

"The key issue," Liberman said, "is how will the revenues be shared."

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## INSIDE LINES

**Toot sweet.** Dun & Bradstreet is expected to announce this week the sale of the assets of its D&B Computing Services subsidiary to Thomson S.A. of France [CW, June 15]. Sources say Thomson will meld D&B with its Princeton, N.J., subsidiary, United Systems Software & Services, and rename the operation Must Software International. Thomson has agreed to keep the merged company in D&B's Wilton, Conn., offices until the lease on its headquarters building is up. Thomson has also agreed to remain in Fairfield County, Conn., for the foreseeable future. Apparently, negotiations became bogged down on a variety of issues, not the least of which was a Thomson requirement that 75% of D&B's employees sign employment contracts.

**On the right TAC.** Lotus this week is scheduled to announce a new version of The Application Connection (TAC), a range of software products that allow IBM PCs to extract data from IBM 370 host applications and have that data translated into popular PC formats. The new version is expected to allow more applications to exchange data, including a connection to IBM's DB2.

**A word to the wise.** In a help-wanted ad last week in the *Wall Street Journal,* IBM said it is seeking experienced attorneys to work on patent and intellectual property matters. Specific technical areas in which IBM is seeking patent-law experience are signal processing, computer systems, computer programming, digital electronic circuits, semiconductor devices and communications.

**Will it play in Peoria?** At the upcoming American Association for Artificial Intelligence show in Seattle, Symbolics, Inc. is slated to introduce an add-in board containing the Intel 80386 microprocessor for use in Symbolics' AI workstations. Symbolics says the board will enable the workstations to run Unix and Microsoft's MS-DOS, along with the library of applications written for these operating systems. Symbolics is scheduled to roll out a software package that will enable applications developed on its machines to be ported to 80386-based PCs.

**We expect to announce our intent to introduce.** Unisys has plans to dive into the 80386 waters sometime in late October or early November. Last week, the company announced its "intent to introduce" an 80386-based PC that will reportedly support Unix and Microsoft's Xenix for multiuser environments as well as Microsoft's MS-DOS and MS OS/2 for single-user applications. Pricing was not available. Unisys also said it will provide OS/2 to users of its PC/ITs, PC/Micro ITs and future Unisys systems when the operating system becomes available early next year.

**Just don't mention the computer.** Trintex, the IBM and Sears joint venture into the ill-fated videotex market [CW, May 25], has come up with a name for its forthcoming service that makes no mention of home computers or videotex. From now on, it will be called "Prodigy, an interactive personal service." As a Trintex spokesman put it, "It's a low-tech name that the average person can relate to."

**Looking to be protected.** A high-ranking Ashton-Tater told *Computerworld* recently that his firm was looking into using tools from non-Microsoft third-party vendors that would allow Dbase III to exploit the large memory of 80386-based machines. Even if Ashton-Tate takes this approach, users should still expect an OS/2 version of Dbase.

**Someday it will all be clear.** A noted computer analyst recently met with IBM officials, who suggested that users interested in running IBM's OS/2 Extended Edition buy only IBM machines. The IBMer likened that version of OS/2 to some IBM software and IBM add-on boards that just don't run on clones. In addition, OS/2 Extended Edition does not run under the Presentation Manager, OS/2's graphics user interface. There are two theories behind this, the analyst said. One is that IBM does not want to have to wait for the Presentation Manager to ship before hawking OS/2 Extended Edition. Another is that IBM began developing OS/2 Extended Edition before agreeing to use Microsoft Windows as the foundation for the Presentation Manager.

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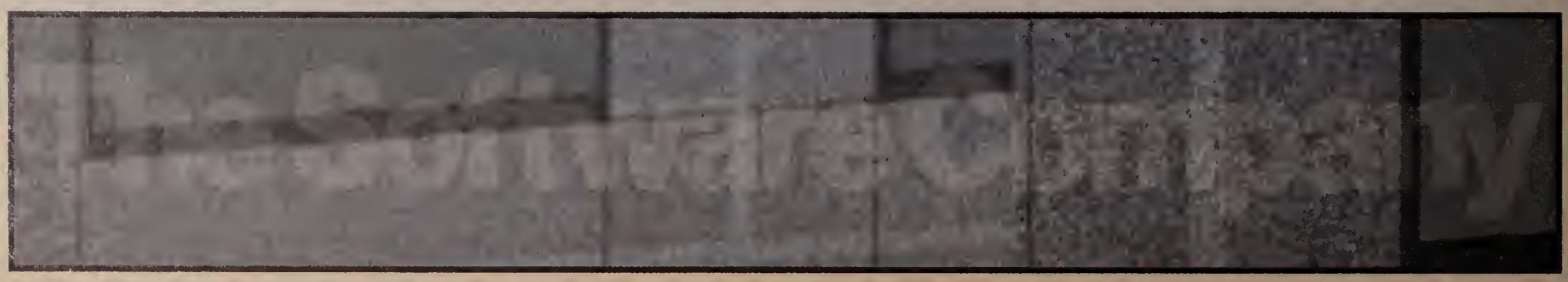

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